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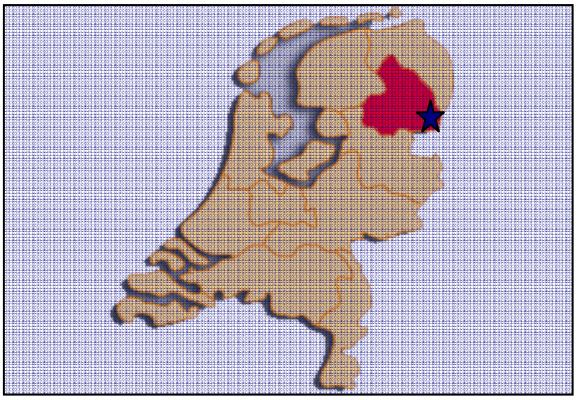

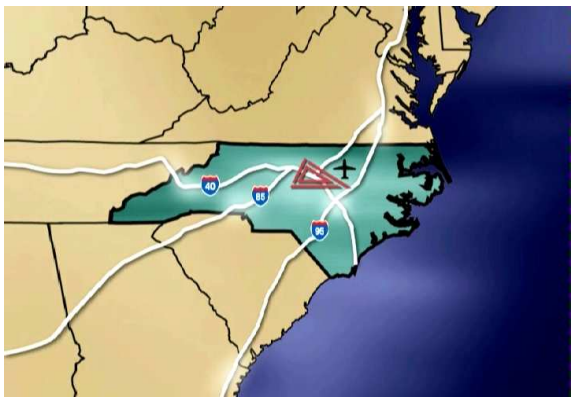

Urban economic (re)development after declining base industries

a comparison between Emmen (NL) and Durham, North Carolina (USA)

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Preface

This thesis is written as part of the master study Economic Geography at the Faculty of Spatial Sciences from the University of Groningen. It means the end of a period that started in 2005 when I enrolled myself for the intake program for the master Economic Geography. It was a time of hard work, fun and making new friends.

During the study I got more interested and excited about the development of regions with changing economies. This resulted in a comparative research about a Dutch and a US region that had to deal with declining industries.

I would like to thank the NEURUS network for making it possible to do part of my research in the US at the Department of City and Regional Planning at the University of North Carolina at Chapel Hill. Writing this thesis in English took quite a struggle and I would like to thank Reid Roberts for his remarks at the grammar and writing during my stay in Chapel Hill and my supervisor Paul van Steen for his substantive and linguistic remarks during my research. This preface wouldn't be complete without thanking the persons who took part of the interviews. For this I want to thank Patrick Byker, Liz Rooks, Ted Connor, Aaron Cain and Ted Abernathy for their time and useful information about developments in Durham and Jan Dirk Huising and Hans ten Cate for their time and information about Emmen.

Finally, I would like to thank my girlfriend and parents who have always supported me during the hard times of the study and research.

Summary

The city and municipality of Emmen are a peripheral region in the Northeastern part of the Netherlands. This region finds its reason of existence in the exploration of peat, which started halfway the nineteenth century and lasted to the beginning of the twentieth. Then the decline sets in. The demand for peat shrank with the rise of demand for other energy sources like coal and oil. This resulted in high unemployment and economic stagnation in Emmen. Nowadays Emmen has a manufacturing/service industry based economy. The questions of how this change from peat-based industry to manufacturing-based industry did take place and also how the developments have taken place in other regions in the world is the starting point of this research. One other place in the world with a similar course of developments is Durham, NC in the USA. Durham developed with the growth in demand for tobacco products and is now a research and development based economy. The goal is to give insight in the process and to give recommendations for other cities how to handle decline in the future.

There are several theories about economic development and economic growth. The decline and shrinkage of cities is also becoming more part of research, started as result of the decline of Britain's manufacturing industries. The agglomeration theory by Marshall, the growth pole theory by Perroux and the cluster theory of Porter are examples of growth theories. More recent Lambooij has filtered 6 factors from the literature that can explain economic growth differences. Others have written about the decline and shrinkage of cities, as well in Europe as in the US, and possible causes and solution. Reasons for decline can be growing competition, suburbanization or innovations and technological changes in a industry. Based on the theoretic framework seven factors play a role in economic development, as well in growth as decline.

- Population and social networks
- Diverse economy
- Good infrastructure
- Local policies / partnerships
- Quality of life /attractiveness
- Incentives
- Investment

These components are compared with the developments in the two case regions, like employment and company growth that did (not) take place, the policies and initiatives that were important and the input

from (local) governments, persons and companies. For example the difference in government interference. Emmen has mainly changed by hand of the local and federal government. Durham has mainly changed by hand of local businessmen with support from the state government. After the comparison from the cases with the theory, recommendation are made. The first recommendation is to accept the fact that decline is happening. Bigger is not always better. Other recommendations are to privatize local government services, provide good infrastructure, as well for transport as for telecommunication and provide a good quality of life. This makes a region a sticky place for companies and employees and will help declining regions to become lively places again.

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Chapter 1: *Introduction*

Almost 27 years ago I was born in the city of Emmen, a medium-sized city in the north east part of the Netherlands with over 56,000 residents in the city and 108,000 in the municipality (Municipality of Emmen 2006). Emmen has the pros and cons of a rural city in the periphery of the Netherlands. In my opinion, Emmen is trying to be one of the larger cities in the Netherlands, but it is too small to actually be one of them. The location is auspicious, with close proximity to the Dutch Randstad region and the German harbour cities of Bremen and Hamburg, and further away Scandinavia. With the completion of the new highway A37 in the Netherlands and the A31 in Germany, there is now a good opportunity for logistic companies to (re)locate to Emmen. This may mark a new step for other investments in this former peat based economic region. It gives the city new opportunities for growth, economic development and wealth after difficult times following World War II and the decline and disappearance of the peat industry.

The peat industry was the first big industry in the region and was responsible for the first growth of Emmen. The development of the peat industry started in the province Drenthe in the middle-ages. In the southeast region, where Emmen is located, the digging began around 1850 following the creation of important canals (Hoogeveense vaart and Oranjekanaal from the West and Scholtenskanaal from the North). Prior to this, Emmen was a sparsely populated community of farmers with mutual grounds for buckwheat growth and cattle stocks (Huising 2007, Van Vegchel 1995).

The centre of the peat industry shifted slowly from the west and north part of the region to the southeast corner of Drenthe halfway into the nineteenth century. By the beginning of the twentieth century, Emmen and its surrounding areas had become the biggest peat growing region in the Netherlands. Although farming peat was strenous work, relative high wages and the lack of an education requirement led many unschooled workers to Emmen to work in the peat industry.

After the First World War, the demand for peat declined with the rise of other energy sources (Huising 2007). The peat industry had to adapt to this change and jobs became more scarce (Van Vegchel 1995, Drenthe online 2007). While many people decided to leave the area for other manufacturing regions – examples include Twente (textile), Eindhoven (Philips) and Limburg (coal mines) - the city was still left with high unemployment. Having been born and raised in Emmen, I am personally interested in how the city has developed since that time. Which companies were important? Which people were important? Were there special financial measures and what was done for the unemployed (low skilled)

peat workers who were still in the area? Asking these questions also raises another: how have other cities in the world dealt with a similar kind of development problem? Are there any solutions to be found in these other cities that can be used in Emmen or in cities that may undergo similar developments?

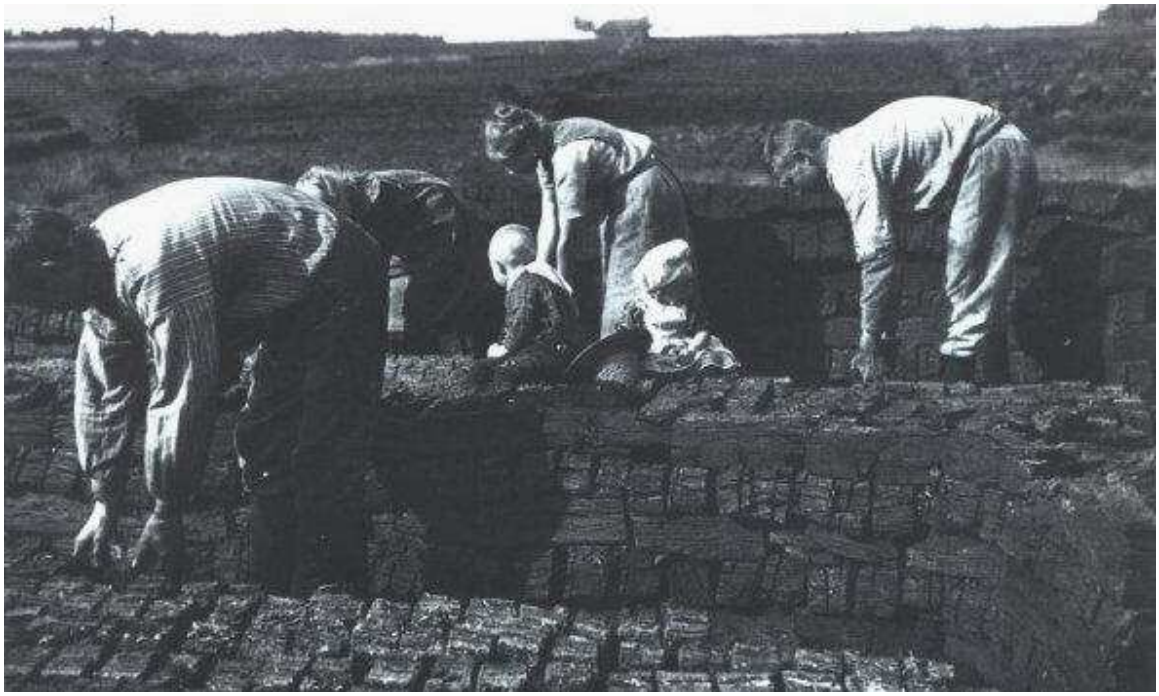


Figure 1: Whole families worked in the peat. Source: http://www.spanvis.nl/Vervening/vervening.htm

One of the many cities in the world that has dealt with a declining industry is Durham, North Carolina in the United States. This city started to grow in the same time as Emmen, around 1850. After the end of the US Civil War, Durham became a flourishing tobacco and textile industry. However, these days the city is known for its well developed research and development industry. The transformation of Durham is also reflected in the change of the nickname of the city. The city was known as the City of Tobacco or Bull City, after the tobacco brand, until the 1980s. But because of the development of Duke University and the growth of the Research Triangle Park (RTP), the city is now known as City of Medicine (Durham Convention & Visitors Bureau 2007). The success of the RTP might be reflected by the fact there have been three Nobel-prize winners among the employees of the park. Another fact signifying the economic development that has taken place in Durham and North Carolina more broadly is the increase in state-income. During the 1950's, North Carolina was the second poorest state in the US (beating only Mississippi), but today the state has the 28th highest per capita income[1].

[1] http://en.wikipedia.org/wiki/States_of_the_United_States_by_income

1.1 Problem definition

Starting point for this research is the development of cities in the western world after their base industry, on which the city has basically grown, has disappeared. In this particular research, a case study detailing how Emmen in the Netherlands (peat industry) and Durham in the United States (tobacco industry) have dealt with the labour forces of these 'lost' industries. After it is clear how these two cities managed their situation, the results will be compared and a final analysis will present recommendations for future cities undergoing similar developments.

1.2 Research Goal

The goal of this research is twofold. The first goal is to get insight in the process of urban development after the base-industry has disappeared. The second goal is to give cities and urban regions who will face these developments in the future some insights into how to prepare and respond to such a situation.

1.3 Research questions

The main research questions are the following:

1. What is already written about urban development with respect to declining industries?

2. What policies and activities have the two case-cities undertaken so far?

    2.1 Which social and economic policies were implemented in Emmen?

    2.2 Which social and economic policies were implemented in Durham?

    2.3 Were specific financial resources available?

3. Which factors are necessary for successful city-(re)development after the base-industry has left?

    3.1 Which government policies and actors where important in Emmen?

    3.2 Which government policies and actors where important in Durham?

4. What further developments can be made in Emmen and Durham?

5. What conclusions can be drawn and which recommendations can be given to cities and regions who may have to deal with this kind of development in the future?

1.4 Research methodology

The expectations are that a combination of existing literature and interviews will point to the actors who have played a key role in the development of the cities and who have provided the financial capital to create a new (healthy) economic climate in these particular regions. It will be interesting to see the similarities and differences between Durham and Emmen in response to their lost industry. The interview questions that will be asked are filtered after a study of existing literature about city-development and city-profiles. These questions included several subjects like an overview of the (economic) policies from the last 40 years and the place of the base-industry in those policies, social and economic structure change in the region, influences, financials and initiatives from (local) governments and private parties (companies or persons) and which persons made the important decisions and last but not least the role of good educational facilities that were (not) available in the region. The interviews in Durham were held during the summer of 2007, the interviews in Emmen were held during the fall of 2007. Based on the theories and literature and with extra information from the interviews, the two regions will be compared with each other and conclusions and recommendations can be made.

Step 1	**Introduction & Literature study**	**Theoretical framework & city profiles**
Step 2	**Interview questions**	
Step 3	**Case: Emmen**	**Case: Durham**
Step 4	**Cases compared with each other and theories**	
Step 5	**Conclusions & recommendations**	

1.5 Bookmark anchor

Chapter one is a introduction on the research and explains the motivation for it. Chapter two describes the theories about economic city and regional developments and gives two city profiles to illustrate that equal developments happen in different cities in different times. Chapters three and four tell the story of the two case-regions, Emmen and Durham, NC. Chapter five compares the two case regions with each other and with the theories and developments found in chapter two. It also gives conclusions and recommendations about the components that play a role in economic development and how in the future economic decline can be handled.

Chapter 2: *Theoretic framework*

2.1 Introduction

The birth and the development of each city is unique. There are differences between continents, countries and regions. Each period in history has had its own influence on the development process of cities throughout the world. Factors which can play a role include an increase or decrease of the population, the economic situation and the location of the city. With the explosive increase of the world population at the end of the nineteenth century and especially the twentieth century (US Census 2007a), the need for planning and rules to control an areas expansion became stronger. Besides the population increase of the existing large cities from the middle ages, small villages grew together to become one big new city. Examples of this in the Netherlands include cities like Tilburg, Enschede (Atzema and Weber 1999) and Emmen. Villages that developed relatively rapidly into cities did so because of a growing population attracted by the employment opportunities available in these city's industries. Both Tilburg and Enschede started as several villages which grew slowly towards each other by the expansion of their textile industry. Emmen developed by the exploitation of peat (e.g. Van Vegchel 1995).

2.2 Regional development theories

The development of cities is in the most cases dependent on the regional developments and specific regional characteristics. Cities located in regions with enough resources and/or with high population did have more perspectives to grow. In the 1920's Alfred Marshall acknowledged a new type of economy, the agglomeration economy (McCann 2001). Sources and conditions necessary for such economies to survive found by Marshall were information spillovers, non-traded local inputs and local skilled-labour pools. These three components have in common the need of other firms. Information spillover happens when employees of different companies are able to quickly exchange knowledge so decisions can be made. Non-traded local inputs is an other component. This means that companies that are not part of the core (base) industry-sector can survive in the region because of the need from the base industry for these supplying and supporting (specialist) firms. The third component is the local skilled-labour pool, meaning firms can save capital because skilled employees are at hand in stead of investing in reschooling employees or transferring skilled employees from other regions. Bristol (UK) can be seen as an illustration of a agglomeration economy (see box 1). In this city a skilled-labour pool was present which made it possible to develop to a diverse based economy.

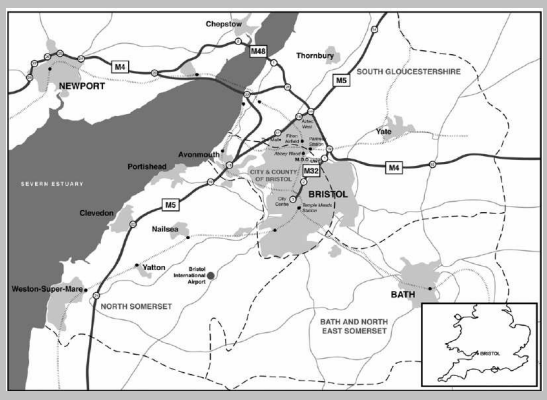
Box 1 example of agglomeration effects

Aerospace in Bristol

Finding its reason for existence in the possibility of trading merchandise at the crossing point of the River Avon, in the beginning of the 20th century the Avonmouth area emerged, besides its traditional industries related with the harbour, by metal smelting and chemical and fertilizer production and aerospace industry. A very diverse industrial base, so Bristol could handle the industrial decline and was less affected by the economic decline in the 1930's. Service industries expanded assisted by the junction of the M4/M5 motorways and the realization of Severn bridge in 1966. Big growth in population and employment took place since the 1970s in the northern fringe 'edge city'. The realization of regional shopping centers, in the peripheral areas, so they are well reached by car, and multi-leisure and entertainment parks contributed to the quality of life of the Bristol area. The M4 motorway is also of importance for a fast and easy connection with London, a 2 hour drive.

The major decline has been in manufacturing, concomitant with wider economic changes, where employment in the sector halved over a 20 year period 1971–1991, a loss of around 48,000 jobs associated with the decline of the tobacco processing and docks industries. By 2001 manufacturing accounted for just 12% of employment in Bristol (compared to over 14% nationally). However, business and financial services employment increased by 150% between 1971 and 1991, contributing an additional 51,000 jobs. By 2001 banking, finance and insurance accounted for over 22% of employment in the city-region (compared to less than 20% nationally). Bristol has experienced diverse economic growth with a combination of national and international inward investment to the city-region, as well as existing local companies expanding in-situ, or relocating to bigger or more appropriate premises elsewhere in the city-region.

The failings in the restructuring process were caused by a conflict between the Urban Development Corporation and the local authority; the lack of a strategic and integrated approach to regeneration; the pressure to demonstrate quick results in terms of flagship developments; a failure to consult with the local community; and the inappropriateness of the Urban Development Corporation model to the local context of Bristol city centre. The new significant housing developments are largely developer-led, although in the context of a favourable policy climate and sustained demand. 'Overspill' effects of the housing rejuvenation in Harbourside are conceivably evident, with neighbourhood upgrading and possibly gentrification being stimulated in adjacent more historic housing areas. A 'bottom-up' approach involved more than 50 local groups and organizations to compose a long-term strategy addressing housing improvements, crime reduction and improving educational standards.



Tallon, A.R. (2007) city profile: Bristol; Cities, Vol. 24, No. 1, p. 74–88, Elsevier Ltd.

Theories that also explain the growth of a region are the growth pole model of Perroux (1955, see later) and more recent Porter's cluster model (1998). According to Porter clusters are a prominent feature of the landscape of every advanced economy, cluster formation is an essential ingredient of economic development (Asheim, Cooke & Martin 2006).

2.2.1 Historical theories

Nafziger (2006) highlights several theories about economic development through the last century: Ricardo's "stagnation theory and diminishing returns from population growth on fixed natural resources"; Marx' theory about the turn over from capitalism to socialism; Rostow's model of the five stages of the city - traditional society, pre take off, take off, drive to maturity, and age of high mass consumption; the vicious circle theory, like Myrdal's theory of cumulatieve causation; and others such as Solow 's economic (endogenous) growth theory, which acknowledges the importance of savings and technological changes. Other theories that are complementary with this theory are the New Economic Geography (Krugman) and the Evolutionary Economic Geography (Frenken et al.) (Lambooij 2007). These last theories also connect with Marshalls's agglomeration advantage theory.

2.2.2 Growth pole theory

Another theory that could explain the growth of cities likes Emmen and Durham is one of the first theories used to explain city growth, the growth pole theory by Francois Perroux:

> *'growth does not appear everywhere at the same time; it becomes manifest at points or poles of growth, with variable intensity; it spreads through different channels with variable terminal impact on the whole economy.'* (Perroux 1955,: McKee, Dean & Leahy 1970, p. 94; in Glas 1996, p 164).

Perroux published his article concerning the growth pole theory in 1955. This theory explains the growth of cities or regions by investments and innovation in what he calls the key industry or key company. For example, a company grows real fast because a new technology is invented. Because of the growth of the key company, other related companies that do a lot of business with the key company will move to the region where the key company is seated. The consequence of this is that rising employment in the concerned region leads to a positive image, which then attracts more companies. This theory only elucidates the growth of companies and industries. According to Luger and Goldstein (1991), this theory explains economic growth of a city by means of innovations within a city or region.

The development of the triangle region in North Carolina is a good example where this theory can be applied. However, the developments in Southeast Drenthe are not applicable to this theory.

2.2.3 Cumulative causation theory

A theory which is related to Perroux' theory is the cumulative causation theory by the Swedish economist Gunnar Myrdal. He speaks about this phenomenon for the first time in the book, An American dilemma: The Negro Problem and modern Democracy (1944), in which he states that the poor (African-American) population becomes poorer because they are already poor. His theory took on worldwide publication in 1957. The theory implies that if a development (in either a positive or negative sense) takes place, this development will continue by (un)known forces in and around the core area. Once a region has created a good economic climate, this region will continue to develop positively because it is favourable for companies to invest in an economically strong region, which brings more employees and more jobs in the service and financial industries. Eventually, this will lead to a decrease of companies in the regions which have a development delay. Myrdal called these developments and factors which play a role “spread and backwash” effects. The spread effects are the effects of a growing region which extends itself increasingly further. The backwash effects apply to the regions which see their companies and inhabitants leaving for the growing region. Shanghai (see box 2) is an example of a urban region which is growing and attracting population and businesses because of cumulative causation. The small fishermen village from the past attracted businesses that wanted to bring Shanghai’s rich hinterlands into culture. The success of these businesses attracted more people from further away to find a job and this again attracted more businesses.

2.3 Economic city development

2.3.1 Economic growth

The first thing to make clear is what is meant by economic growth and economic development. This is important because although a lot of people and corporations use these terms, they can mean different things. Lambooij (2007) defines economic growth as the growth of regional or national product (gross domestic product (GDP)). He calls it also productivity growth. This can be reached by investment and the upgrading of working hours. An other term of importance is human capital. Human capital is defined as the skills and knowledge that make workers productive and this leads to diffusion of knowledge and growth. According to Lambooij the economic variables of which the productivity is depending are labour, capital, organization and nature and scale of markets.

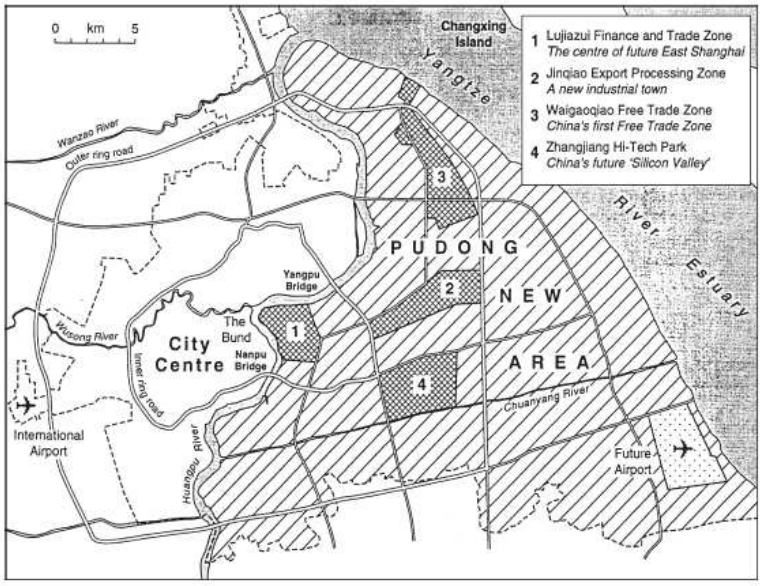
Box 2 example cumulative causation

Shanghai the new economic powerhouse of China and East Asia

Shanghai started as a fishing village in the 10th century. Becoming China's largest seaport was possible because its hinterlands are some of the richest in resources and population. The growth of the city population and industries brought also problems to the city. A lack of investments during the 1970s and 1980s resulted in housing problems, no good water and sewer system and an old urban infrastructure that was not in good maintenance. All the money was spent in industry. Big investments in infrastructure started between 1991 and 1996, when about US $10 billion was invested in infrastructure projects, such as two bridges (Nanpu and Huangpu bridges) and a tunnel across the Huangpu River, an inner ring road, an elevated north–south throughway, and a new subway line.

One of the major determinants of Shanghai's success will be the speed with which urban infrastructure is updated. The city's current infrastructure cannot accommodate the needs resulting from rapid growth. Many parts of the infrastructure system need to be repaired, particularly in the old central city. Authorities are banking on some new urban districts, such as Pudong, Minhang and Hongqiao, as the future of the city. Together with residential and infrastructural relocation in the city centre to create room for high value (commercial) real estate developments, Shanghai can compete with other major cities in the region, like Seoul and Bombay.

The special regulations that have enabled economic development in China's Special Economic Zone (SEZs) to take off have been extended to Pudong: tax exemptions for enterprises doing business with foreign companies, tax holidays for new factories set up with foreign investment, and a bonded zone – the largest and first in the country – for duty-free imports of raw materials. So far, most of the new tenants in Pudong are banking on tax concessions and duty-free imports of raw materials to assemble finished goods for export. More importantly, Pudong is buttressed by China's strongest industrial, science and technology capabilities of Shanghai, something not shared by all the SEZs. The realization of a new airport nearby Pudong is important for the development of Shanghai to a leading international commercial and trading city. 'The critical issue Shanghai faces is how the city can revive its old, build its new, and integrate them to create a metropolis accommodating modern industrial, commercial and cultural activities on the one hand, and providing a rising quality of life for its residents on the other.'



Map of the Pudong New Area. Source: Massey et al., 1997.

Wu, W. (1999) City profile; Shanghai; Cities, Vol. 16, No. 3, pp. 207–216, Elsevier Science Ltd.

For labour one can think about education level, amount of labour, creativity and age partitioning of the workforce. Capital is about the amount and endurance of investments and the opportunity to innovate. Organization provides the base from where activities take place and in what hierarchy. Finally, the scale and nature of markets is about the level (local, regional or (inter)national) and about the form (open markets or protected, competition or monopoly). Lambooij found that there are 6 factors important by explaining growth differences:

1. Economic and demographic size and differentiation,
2. Production systems, labour productivity and entrepreneurship,
3. Connectivity (transport infrastructure, ICT and people),
4. Consumption system,
5. Attractiveness,
6. Adaptation after innovation and technological changes.

The Fund for Our Economic Future ("The Fund"), an organization that "unites philanthropy in Northeast Ohio to support economic development initiatives and actions that support Ohio's growing economy" (The Fund 2007), has done a study that analyzes the economic data of Ohio. This study can be seen as a field example in relation to the 6 factors named by Lambooij. Using statistical data about jobs, per capita income, output and workers productivity, this study came to the conclusion that there are eight key factors that correlate with regional economic growth:

1. Skilled Workforce (educational attainment and skill levels)
2. Business Dynamics (small business activity)
3. Urban Assimilation (ethnic diversity, new immigrant populations, and minority business ownership)
4. Racial Inclusion (a social rather than economic dimension)
5. Legacy of Place (the cost associated with aging infrastructure and declining industrial base)
6. Income Equality (both disparity and the number of children living in poverty)
7. Location Amenities (quality of life variables)
8. Urbanization/Metro Structure (core city poverty levels)

The numbers 1, 3, 4 and 8 can be seen as examples of the economic and demographic size and differentiation as mentioned by Lambooij. The business dynamics is an example of number 2 from Lambooij. Legacy of the place can be seen as an example of both connectivity (infrastructural costs) or number 6, adaption after innovation and technological changes. Income equality is part of the consumption system and also of the economic differentiation. Location amenities play a role in the

attractiveness of a place. Remarkable in this study is the positive correlation of the social factors, racial inclusion, income equality and urban assimilations, with economic growth and development. In this analysis, economic development will be measured by economic growth as it relates to employment, private income, and also quality of life.

2.3.2 Analyzing a city

There are two ways of analyzing cities, a global approach and one that works from the inside out (Fainstein 2002, 1990). The first looks at a city's development caused by national and global factors. The second one takes a look into the stakeholders in a city that were important for its development, like the economic base, social structure, political interest and actions of participants. Using the global approach for Durham, it shows that the city developed with the growth of the tobacco industry after the ending of the civil war. The city became (inter)national known as Bull city and competed on a international level. Its position near a railroad station made it a good spot for distribution also. With the rising knowledge about the health impact of smoking and chewing tobacco-products, the city recognized the limitations of the tobacco based economy and in the 1950's there were several plans on how to go further in the future before the declining tobacco-industry would cause too much problems. The development of the Research Triangle Park from 1960 to the present shows how the city is still competing on a international level, with a whole new economic base. The second approach will show how in the city of Durham people were successful in building up their companies and how the city took advantage of that by developing other sectors like the textile-industry and furniture-industry. The income was not very high, so in the 1950's there were some people who thought they could make a difference and started to develop plans for a change in the social and labour opportunities. Initiatives came from both private and public parties and resulted in the same proposal, the better use of the university graduates in the region. The result again is RTP and a higher mean of the residential incomes.

2.3.3 Shrinkage in Europe

The future of big, older cities lies in the capturing of informational and financial jobs or other high-skilled jobs. Manufacturing is moving to peripheral locations. Many cities have still not recovered from the huge losses of manufacturing jobs caused by the decline of this sector during the globalization in the second part of the twentieth century (Rybczinski & Linneman 1999, Rogers 1982). Although a big part of the jobs is replaced by service industry jobs or jobs in wholesale and retail, a lot of places are still dealing with high unemployment rates and declining population (Lötscher et al. 2004).

Locational factors are also important for the development of a city (Fainstein 2002, 1990). The most important is the group called business climate. If a city is very depending on one sector (like port-cities as Liverpool, Baltimore or Rotterdam) the climate is very sensitive for changes. Like the rise of the price for dock labour and the capacity of a few ports to handle huge amounts of containers (Rotterdam) caused several other port-cities (Liverpool and Baltimore) big problems in their economy, because the cities had few non-port related sectors that could develop other economic opportunities. An other example of a city that was very dependend of the locational factors is Eisenhüttenstadt (Lötscher et al. 2004). This city in former East Germany was to dependent of just one economic factor, iron. Unification of East and West Germany started the decline. A lot of people moved to the western part of the country to find a better job and better life, especially the higher educated people (braindrain). This is also found by Matthiesen (2005) in other East German cities like Guben and Frost. The unification also had an other effect, the local iron company was taken over by a western company that in the perspective of globalization reorganized the local company which resulted in a huge loss of jobs. The demand for family houses increased, meaning the apartment buildings in the city centre were not longer sufficient. An indicator for the decline is the retail sector. The condition of the shops became worse and vacancies where increasing. For dealing with the decline it is important that on al government levels the parties will work together (Lötscher et al. 2004). And not just the government, also the local businesses have to join in the redevelopment. Options that are given to stop the decline are diversification and extension of iron-associated activities and improvement of the infrastructure. Matthiesen (2005) ads to this that decline is a consequence of weak social networks and a lack of additional cultural urban activities. Solutions according to Matthiesen are realizing smaller can be better, traineeships initiated by local creative companies and persons to keep high-educated people in the urban region and the role of partnerships. Success is dependent of the right time, place and people. In Britain, the regeneration of the manufacturing cities that were hit hard by deindustrialization were not very successful (Carley 2000). He concludes there was a lack of good governance and urban partnerships. The policies should involve the whole city and not just the worse parts of it. Carley gives the following options for restructuring declining cities:

- Work with local initiatives (e.g. Rhondda, a former coal-mining valley in South Wales)
- Modernize the local government
- Invest in new and improved transport and infrastructure
- Integrate initiatives from different levels (bottom-up and top-down) and organizations.

2.3.3.1 Decline in Britain

An example of a city that is familiar with decline is Birmingham. This city was hit the first time by decline at the end of the nineteenth century (Rogers 1982). During this time British cities were feeling the competition of upcoming industrial countries in Europe. For example production and manufacturing jobs in France, Belgium and Germany had lower wages and higher profits because of protective duties. An other reason was the overproduction that took place in manufacturing and food-related industries as in cities like Birmingham. This let to pressure to restructure the businesses. Strategies that were used are shifting to a new product, reinvestments in new productive methods and/or relocation of production and the cutting of wages. The last was only possible in regions without or with a weak trade union. The restructuring in Birmingham led not only to changes in the industrial sector, but also on social, political and urban level. Skilled labour was replaced by machines, new technology was housed in new factories. Rogers (1982) concludes that decline in Britain took place as a result of international variables, such as wage rates and productivity, becoming the defining parameters for British capital. Workers had to learn to work with new machines. Cheap land and an existing working class in suburbs with low standard of living proved to be great incentives for industrial investment. The factors for local developments during decline and recession are located outside the area itself.

2.3.4 Shrinkage in the US

After the second world war, especially during the 1970´s, a lot of big cities in the US were dealing with decline and great fiscal problems, every city with half a million or more residents was in trouble and it seemed to be that the bigger the city, the bigger the problem (Beauregard 2003, Rybczinski & Linneman 1999). And the role of the governments in the development of the industrial city had changed (Savitch 1988). New York was just a snap away from going bankrupt in that period and was only saved by major national governments investments after several attempts to get some kind of financial support. Also Los Angeles, Chicago, Boston and Philadelphia were suffering from the economic recession that hit the world at that time and the movement of the population to the so-called Sunbelt-states in the south and the south-west. The US economy also had to deal with the recovering economies of Europe and Japan (Conner 2007, Rybczinski & Linneman 1999). When the industrial companies in the downtown area did well, the cities provided a high living standard for her workers and had no problems to maintain the public and social infrastructure that is needed to keep the city going. After the companies left because of several reasons, like higher taxes, worse availability of

space and infrastructure, worse quality of life for the employees and no room for expansion, the cities could not longer put up with the high payments for the maintenance that is needed for the cities to survive. The focus of the postindustrial city was on international competition. The development and transformation from industrial to post-industrial city became a process stimulated by both private and public sectors (Savitch 1988). Lichtenstein (2007) discusses in this light the urban region of Syracuse, NY. Here new economies are available because the presence of creative occupations and people. The accent lies on the quality of life of this region. It is green, clean and has a lot of recreational activities that people can do. The initiatives are successful because of partnership of different levels and organizations. In the Northeast and middle Western part of the US cities have to work hard to stop the decline. A few tactics to handle the decline are mentioned by Rybczinski & Linneman:

- Restructure the inner cities, not by building or block, but by neighborhood.
- Privatize services like maintenance and public transportation to lower the costs
- Lower taxes, less cumbersome rules and laws, more public services and restructure the infrastructure
- Accept to be a smaller city, try to make the best of that.
- Sell city-grounds to developers and try to create that thing what the people find in the suburbs: a good quality of life.

2.4 Summary

Regional and urban growth and developments go together with the birth of agglomerations and clusters. Population and workforce are important factors hereby. Various theories about clusters and their agglomeration advantages have been developed by various researchers. Marshall provides with his theory three reasons why such economies can be achieved. Information spillover, non-traded local inputs and local skilled-labour pools are the three headlines of this theory. Porter also acknowledges the role of clusters in regional economic developments and the influence of clusters at the urban landscape. Bristol is such a city. Here the agglomeration advantages have led to a diverse economy that could deal with the industrial decline that hit Britain in the last century. The service industry has been mostly responsible for that. The good living standard and infrastructural networks (transport and social) also contribute to this. Traps in the process can be a bad planning, bad policies that are focused on just one part of the problems in stead of dealing with the city as a whole. For a smooth restructuring it is recommendable to listen to local initiatives and create partnerships.

Bristol:	Harbour developed to a diverse economy with agglomeration advantages	Nice living climate, good infrastructure and networks	Decline in manufacturing, but increase in the (financial) services, relocation of businesses and investment	good (long term) planning, pay attention for local initiatives, create good partnerships.
	<1900		2000	Future

Lambooij points to 6 factors which can be used by explaining economic growth. The Fund for Our Economic Future finds 8 key factors that correlate with economic developments. The correlating factors of the Fund can be seen as parts of the 6 factors noted by Lambooij. Other theories mentioned that explain city and regional developments are the growth pole theory from Perroux and de cumulative causation theory from Myrdal. Both theories have in common that economic growth is caused because of the presence of one key company that starts to grow by the invention and user-advantage of a new technology. Although Shanghai did not grow because of a new technology but because of the rich hinterland, the cumulative causation theory can be applied on it. Especially the spread- and backwash effect theory is very applicable. Some of the factors playing a role are the infrastructure and tax-incentives. A duty-free zone for importing raw materials is just one of the ways how Shanghai wants to prevent further decline. This city profile shows the importance of infrastructural developments for the survival of older cities into a new economically healthy region.

Shanghai:	Surrounding rich of resources Natural growth, influenced by business and government	Decline inner city, caused by bad infra, bad houses and suburbanization	Recovery by investments in infra and tax incentives	make plans for the whole city, pay attention to local initiatives
	<1900		2000	Future

The last part of the chapter describes two ways of analyzing a urban region and the shrinkage processes in Europe and the US. Analyzing can be done in two ways, a global approach and one that works from the inside out. The first looks at a city's development caused by national and global factors. The second one takes a look into the stakeholders in a city that were important for its development, like the economic base, social structure, political interest and actions of participants. Table 1 gives an overview of these components and others that play a role in urban economic growth and decline, extracted from the city-profiles and theories about shrinking cities in the US and Europe.

Table 1 Components playing a role in urban economic growth and decline compared to Lambooij

Lambooij	*Lötscher, Howest, Basten*	*Rybczinski/Linneman*	*Carley,*
economic and demographic size and differentiation →	Dependency of just one economic factor / diversification and extension of (iron-associated) activities	Growth of cities in the south and west US: - annexation of surrounding areas - arrival of immigrants	Work with creative local initiatives (partnerships) *(also Matthiesen, Lichtenstein)* US: not capable of mixing the process of inner city decline and suburban growth. Policies should include the whole city, not just the problem areas
production systems, labour productivity and entrepreneurship →	A contradiction is the subsidy for moving to rural places by the national government	Sell city-grounds to developers and try to create that what the people want / restructure the inner cities, not by building or block, but by neighborhood.	Short-term policies are not effective
connectivity (transport infrastructure, ICT and people) →	improvement of the infrastructure	Privatize services like maintenance and public transportation to lower the costs and restructure the infrastructure	Invest in new and improved transport and infrastructure
consumption system →	Americanization; big shopping centers outside the cities *(also Matthiesen)*	more (public) services	
adaptation after innovation and technological changes →	not just the government, also the local businesses have to join in the redevelopment (partnerships)	Lower taxes, less cumbersome rules and laws	Integrate initiatives from different levels (bottom-up and top-down) and organizations (partnerships)
Attractiveness →	Globalization/braindrain *(also Matthiesen)*	Accept to be a smaller city, try to create a good quality of life	Modernize the (local) government

Out the table above and the theories and cities as described in this chapter, the conclusion is justified that the following factors are important for urban regions that suffer from economic decline and shrinkage to get back on the path of economic development:

- ***Population and social networks*** (the size, partitioning, education level)
- ***Diverse economy***
- ***Good infrastructure*** (connectivity, globalization)
- ***Local policies / partnerships*** (governments, private companies, an open mind for ideas from society)
- ***Quality of life /attractiveness*** (family fun and happiness)
- ***(tax) incentives***
- ***Investment (education and technology)***(creativity and innovations)

Chapter 3: *Economic development Emmen*

3.1 Historic overview: from peat to industry

Up to halfway the nineteenth century the region southeast Drenthe was made up of small farmer communities which jointly used the available grounds for cattle and buckwheat cultivation. The people lived mainly of barter. Large parts of the area had not been developed. In this period approximately 3000 persons lived in what is now the municipality Emmen, of which approximately 600 persons (20%) lived in the village Emmen (Ten Cate 2007). As from the middle of the nineteenth century this swampy peat area was gradually developed. Peat grubbing lured many workers and entrepreneurs from all over the Netherlands and the number of inhabitants of the region increased steadily. Around 1900 the region had over 19,500 inhabitants and in 1920, this had grown up to a number of 40.000. At that moment 8,000 inhabitants (20%) lived in the village Emmen (Municipality of Emmen 2006). so the proportion of inhabitants that lived in the village had not changed. A number of important factories and companies which established themselves in this period in southeast Drenthe included the first factory for the produce of activated carbon out of peat by the Groninger entrepreneur W.A. Scholten in 1889, in Klazienaveen, a dairy factory in Emmen (1893) and Cement Industry Erica in Erica (1908).

Figure 2: Impression of working in the peat. Source: http://www.spanvis.nl/Vervening/vervening.htm

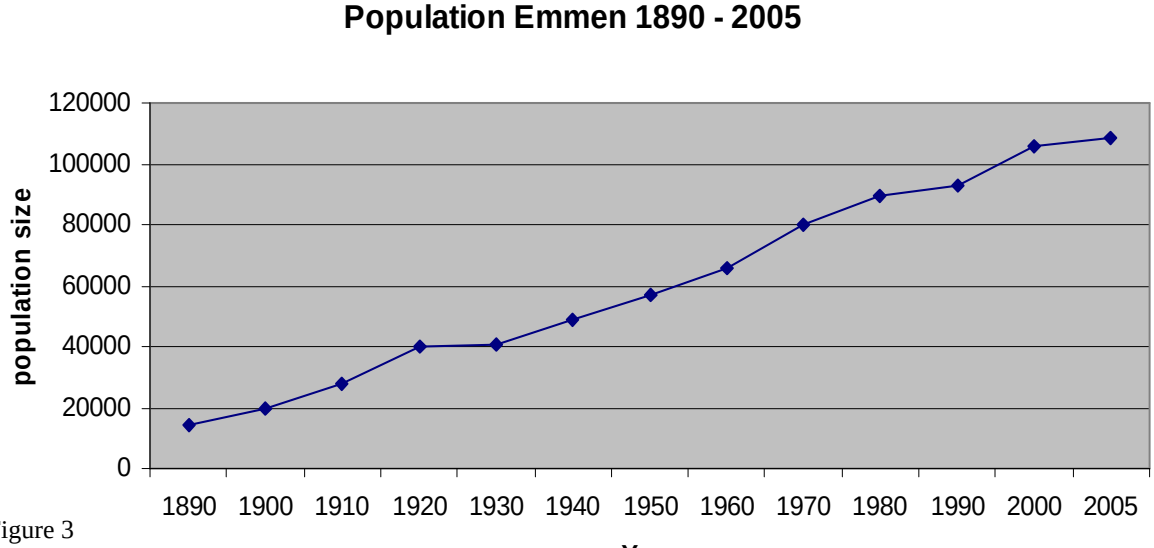


Figure 3
source: municipality of Emmen 2007
* In 1998 10212 persons went over because of merging of the local governments in southeast Drenthe

3.1.1 Unemployment

In the 1920s the peat industry had to deal with strong competition of other minerals and energy sources. Especially the rise of coal had a large negative influence on the market of peat as fuel (Huising 2007). This led to a large degree of unemployment amongst the peat workers and also brought financial difficulties for the municipality Emmen. Because of this Emmen was put in ward by the federal government in 1923. This led to aid measures and work providing projects which had to help the region back on top. Moreover workers were stimulated (also with financial resources) to seek work elsewhere in the country. Many workers left to the coal mines in Limburg, the textile factories in Twente, Philips in Eindhoven and to the port of Rotterdam to work or emigrate. Besides this there was a small increase in the number of industry jobs because a few new companies started in the region, like small construction companies, a sock factory and a factory of Purit (1921), a company which is involved with the production of activated carbon from black peat. In 1924, this factory was taken over by Norit, known by the tablets against stomach and bowel complaints. Approximately half of the population in that period was destitute, with bad housing and little bread on the beam (Van Vegchel 1995). In the 1930s it showed that the work providing projects of the twenties were not sufficient in pushing back unemployment. More than half of the peat workers, approximately 6000 people, was still without work. In 1937, the unemployment in southeast Drenthe is

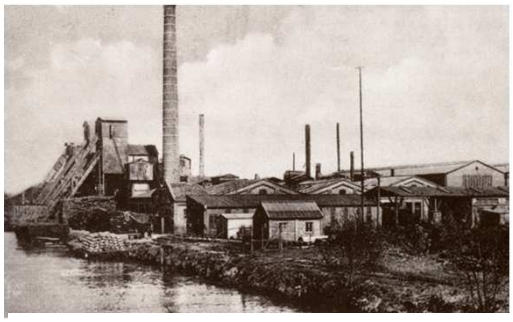


Figure 4: Purit Factory in Klazienaveen, 1920s
source: Ten Cate 2007

about 25 %, compared with a percentage of 11% for the whole country. In this period the industrialization commission Emmen is determined that because of the lousy infrastructure in southeast Drenthe the region has little chances on improvement. Emmen requests aid to the federal government and in 1939, this results in a first report concerning the situation in southeast Drenthe. During the second world war the peat industry experienced a flowering period because of a lack of coal. At the same time the N.E.T.O. (northern economically - technological organization) of Drenthe and Groningen wrote in a report (1940) about the serious impact of increasing unemployment. They wrote with great force that industrialization was the only correct way of this fight against unemployment, in combination with government support (Historisch Emmen 2007). During the war the German occupier ordered the Bataafse Petroleum Company (present Shell petroleum) to seek for oil in the surroundings of Schoonebeek. As from 1947 this is taken over by the Dutch Oil Company (NAM) that started seriously with the oil extraction.

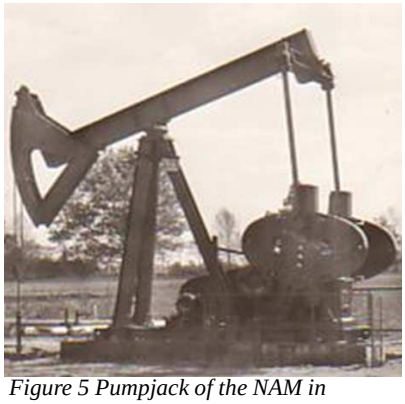


Figure 5 Pumpjack of the NAM in Schoonebeek source: Ten Cate 2007

3.1.2 Interference & initiatives

In 1949, based on the N.E.T.O. report from 1941 and by a strong lobby of Mayor Gaarlandt, the federal government gave their approval to the development plan southeast Drenthe. This matches with the active policy of the government to invest more in the industrial politics and with the European recovery program that was started after the second world war, also known as the Marshall Plan (Huising 2007, Van Veghel 1995). Also of influence was that the municipality Emmen had a powerful governing board after the war, with the earlier-mentioned Mayor Gaarlandt and also Alderman Zegering Hadders. These two politicians had many entrances and good contacts in The Hague (where the federal governments holds residence) and got a lot of work done. This led, however, to some tensions within the municipality. The prominent citizens who made the decisions before in the municipality, were overruled from above by the decisions of the local and federal governments.
Also the DUW (service for the execution of works) created 3100 new jobs in the region with a few projects and industrialization starts to come on pace. Companies like Emmein (steel constructions) and the AKU (synthetic silk-factory in Emmer-Compascuum) started their factories in the region at the end of the 1940s, attracted by large pool of cheap and willing workers. Also in 1947 the Industry Commission Emmen is founded by a number of prominent entrepreneurs. This commission concluded that Emmen was not yet ready for industry, because many employees in the summer returned to the peat because of higher wages. Besides this the infrastructure and the public transport were not yet able

to lead the worker flows in good ways. They also considered it a social duty to get rid of the socio-economic delay in all southeast Drenthe, but because upgrading the infrastructure costs too much money, there was chosen for two industrial cores. Emmen became appointed as the core and Klazienaveen became the secondary.

3.1.3 Policies

Before the first Industrialisatie nota (September 1949) was approved by the parliament, the federal government got eye for the extraordinary circumstances in which some parts of the Netherlands found themselves. In 1947 a discussion bill in which was suggested the idea to promote the establishment of industries in areas with large labour surpluses, had been brought out. In October 1948 minister Van den Brink brought a working visit to Drenthe. Mainly in southeast Drenthe, where a lot of peat-cutters had to lay down their labour in the peat, the problems were urgent. Unemployment and bad social services led to social tensions and because of the minimal infrastructure the chance on economic development was small. One day after the working visit the Ministry of Economic Affairs was put to work and in 1949 the Prosperity plan southeast Drenthe appeared. Infrastructure was the political key to the prosperity promotion: the highway Zwolle-Emmen had to be improved, a extension of the water supply system was provided, about thirty bridges and canals had to be improved and industry areas became constructible by the DUW. With a reference to the `fertile soil for communism' the plan was presented to the Americans who had established a fund for economic development of Europe with the elsewhere mentioned European recovery program. The application was remunerated in the middle of 1950 and on 13 July 1951 also the House of Representatives approved the plan (Van Vegchel 1995). The problems in southeast Drenthe were by no means unique and the prosperity plan was thus both exponent of and model for the political ambition to the upgrade of the region. This ambition came of two sides. Both local and provincial politicians and the federal government took the initiative and often cooperated. The intervention of the federal government resulted that in the distribution of money and the implementation the focus was mainly on the village Emmen. This led to tensions within the municipality Council with the members from the small villages.
In the second Industrialisatie nota (1951) the government made itself strong for spreading the industry. This resulted in regional policy which concentrated on 8 development areas, including southeast Drenthe (see appendix 1; regional policies in the Netherlands). Some measures were subsidies for the improvement of infrastructure and social services, migration premiums for unemployed persons who would leave and settling-in grant for companies. The industrial break through in Emmen also came in this period, with the arrival of a new nylon factory of the AKU to Emmen and the stocking factory of

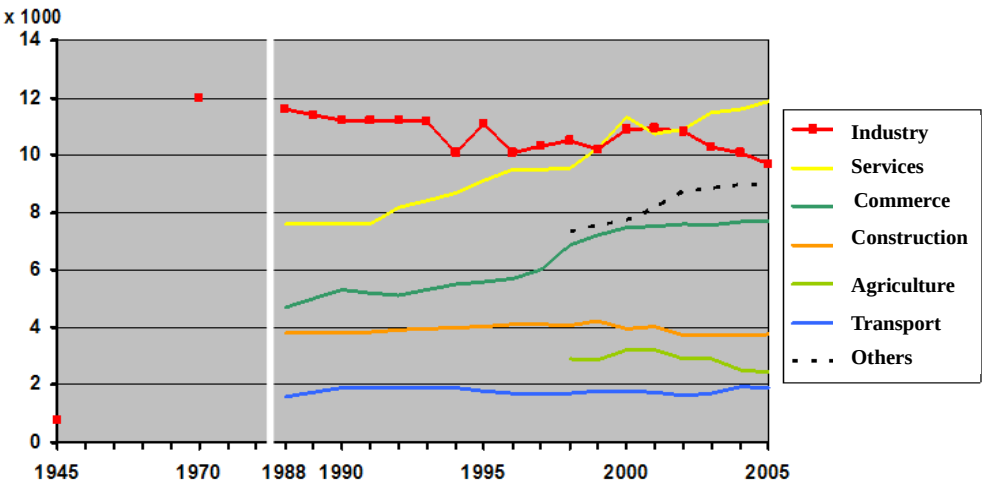


Figure 6
source: municipality of Emmen 2006, Ten Cate 2007, Historisch Emmen 2007

the Danish Danlon, the first foreign venture which established himself in Emmen. In the 1950s the debt burden of the municipality Emmen ran to over €11 millions. According to the municipality Council this was with thanks to the establishment costs of the AKU. The relationship between the local and federal government in this period is best described as difficult. As mentioned before, the municipality felt more for spreading the industry over the several small villages in the municipality, whereas the federal government continued to concentrate the industry in Emmen. And because the federal support was indispensable for the municipality, nothing changed.

Overview of some companies that started between 1955 and 1970 in the region southeast Drenthe

1956	NIRA, now Sony Ericson
1957	Drentea
1959	Begin glasshouse horticulture in Erica
1961	Ten Doeskate, in 1967 Unilever, since 1983 DSM
1963	Honeywell
	Van Vollenhoven, now FanoFineFood
1970	Draka
1971	Lufkin, now Cooper Tools

Source: Ten Cate 2007

In the seventies it was for the first time since the postwar growth that the industry in southeast Drenthe was doing badly (Ten Cate 2007). One of the factors that had influence in this was the first oil crisis in

1973. The oil extraction from the NAM in Schoonebeek touches to a depth point and also the AKU, in the meantime renamed to Akzo, got in financial problems with losses which in 1975 ran up to approx. 1 million guilder per day at the Enka-division in Emmen (Ten Cate 2007). Also was the factory in Emmer-Compascuum closed down in 1977. At the end of the seventies and beginning of the eighties recovery slowly sets in. Some companies that came to the region in that period are Vicon-polyester, nowadays part of the VDL-group, in 1978 and VleemsFood in 1981. The NAM also tries to make the oil extraction more profitable and starts in the period 1977-1982 a modernization program. But it is nevertheless decided in 1996, to make an end to the oil and gas winning in Schoonebeek and the location was closed. 40 Millions m3 oil have then been won, a quarter of all oil reserves in Schoonebeek.

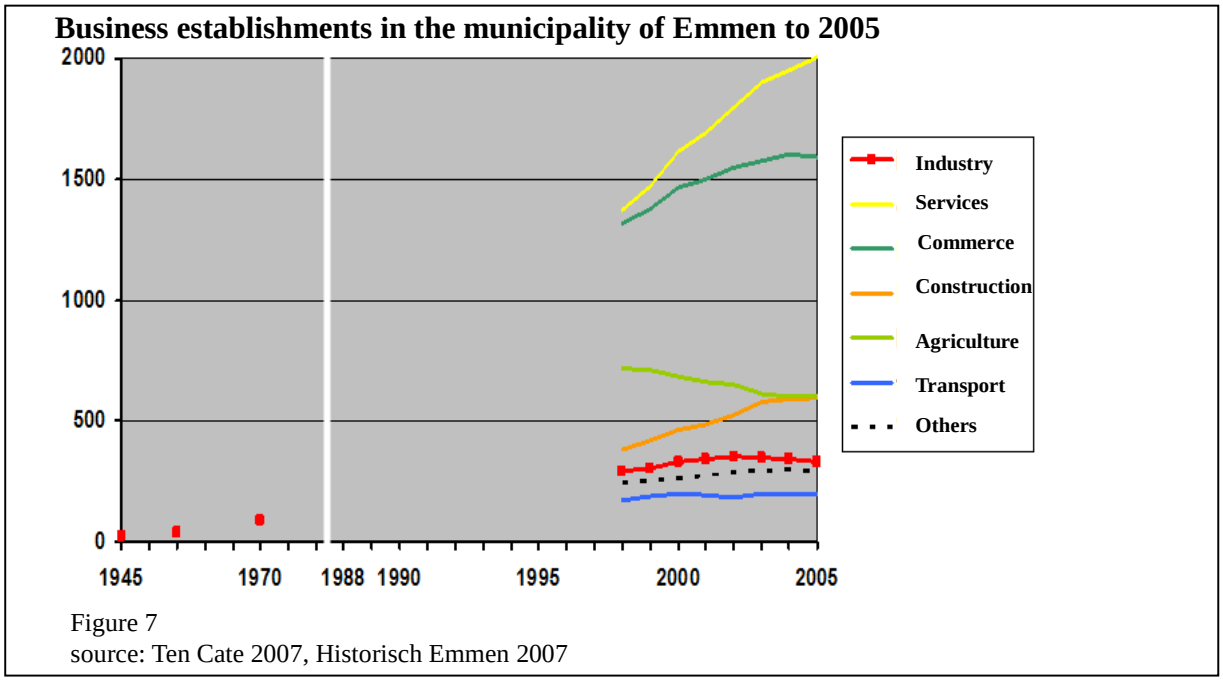


Figure 7
source: Ten Cate 2007, Historisch Emmen 2007

3.1.4 Business investments

The arrival of the AKU to Emmen did not happen just like that. The AKU had a number of requirements which had to be satisfied. They required a railway connection and factory track, improvement of the road system, construction of the industrial area by the DUW and the construction of what is now the Bargermeer-canal. Besides this there had to come 200 houses for the future workers, 30 middle class houses and 10 villas for the management. And on the social level there had to come entertainment facilities, like a theater, cinema, swimming pool and improvement and/or extension of the sport facilities. This wasn't everything, also they wanted compensation for travel expenses of the construction workers, an education allowance for retraining ex-peatworkers and a compensation for relocating trained workers from elsewhere of the country. The ministry of economic affairs granted all

these wishes, but sent a letter to the AKU with the request to bring this not into the open. The AKU responded on this with a letter that stated that they could not do that, because they didn't want to give any reason of suspicion of donations on itself. And because the ministry granted these demands and it had become public, one could not do anything else than approve these kind of demands elsewhere in the province for other companies. By this way there were investment incentives, reductions on purchase of construction grounds, extension premiums and tax advantages available in Drenthe. Also the earlier by the AKU enforced demands like compensation for relocating trained personal, training allowance for non specialist workers and the availability of houses became part of making it more attractive to establish in Drenthe (Ten Cate 2007).

Box 3 Illustration of the income inequality in Drenthe

Incomes Drenthe and Groningen stay behind

Half a century ago the average income of the inhabitants of Drenthe lay a quarter (25%) lower than the income of the average Dutchman. In the course of years the difference has become always smaller and was in 1975 just 10%, and 10 years ago between 2 up to 3%. The difference has grown the last years not smaller but larger and has according to the last data of CBS (2004) become 5%. In 1998 the average income of a Drent was € 465 lower on an annual basis than of an average Dutchman, in 2004 this difference had increased to € 600 by inhabitant. With respect to the richest provinces Utrecht and Noord-Holland the income in Drenthe lies 13% lower. Drenthe is as a matter of fact with an income of 5% under the national level not the poorest province, in Friesland with -9% and Groningen with -10% (in 2002, still -9%) the average incomes are lower.

Southeast-Drenthe and East-Groningen

The 3 municipalities in southeast Drenthe and the municipalities in east-Groningen have been seen with regard to income the weakest in the provinces Drenthe respectively Groningen. Inhabitants of Emmen, Borger/Odoorn and Coevorden have 4 a 5% less to spend than the average Drent and 9% less than the average Dutchman. Ten years ago this was 7%. Because the income in the richer municipalities has increased more with respect to 1998 (34 a 35%) then the poorer municipalities (30%) the differences have become only larger. Regional differences exists for years and it is difficult to level within short terms. Unemployment percentages play a prominent role at income differences. The percentage not working jobseekers is for example this year 7.5% for the Netherlands, for Drenthe 9.2%, Groningen 10.8% and Emmen 12.3%.

Differences in level of education are tough problems: In Emmen for example 15% have college or university training, national this is approx. 35%. In Emmen 39% has as highest education highschool, national this is 29%.

Thole, J.H. (2007), Incomes Drenthe and Groningen stay behind; Emmen.nu, October 24, 2007

3.2 Summary and conclusions

The literature in chapter 2 gives a wide scale of components and variables that can play a role in decline. In relation to the developments in Emmen during the last century some of these are applicable and some are not. Table 2 gives an overview and summary of the most prominent variables in relation to the situation in Emmen.

Table 2 Emmen and variables and components in economic growth and decline

Variable	***Did (not) take place in Emmen***
unemployment and globalization	High unemployment as result of the decline of the peat industry as result of other resources becoming available (is a globalization effect)
creative, high educated population	Working in the peat and manufacturing was for low-skilled workers. Changes has been set in since. Now there is an intermediary (a knowledgecentre/incubator) between businesses and education
(Financial) investments	The city has invested for the demands of the AKU, the national government has invested with the relocation of public services.
Infrastructure / transport / connectivity	Emmen had for a long time a moderate connection with the rest of the country. Since a few years now there is a highway. Also the public transport wasn't of a high level, but with the arrival of the AKU this improved.
Income	The average income in Southeast Drenthe has always been beneath the national average. This is still the case. The hard competition between northern cities (like Assen, Heerenveen, Drachten, Groningen) makes it hard to attract enough new companies for more employment, so it stays difficult to close the gap without a decreasing unemployment rate.
Quality of life	The surroundings of Emmen are green and perfect for biking or hiking trips. The city is one of the greenest and safest in the Netherlands and provides a good climate for workers and their family.
Local policies / partnerships	Local public leaders were involved with the movement of several companies to the region. Public-private partnerships are upcoming.
Long term planning	The industrialisatienota's, regional policies and on a local level for instance Emmen Revisited.
Economic diversity	With the arise of the internet and ICT the economy of Emmen has become more diverse. Also the care and service sectors are growing, while manufacturing is decreasing

Chapter 4: *Economic development Durham*

4.1 Historic overview: from tobacco to research and development

The last activities in the tobacco industry in the area of Durham disappeared during the 1990s. In the middle of the 1980s there were still approximately 10,000 jobs in this sector out of the 100,000 that the tobacco industry in Durham had during its finest hour (Byker 2007). Byker: “Around the middle of the 1950s the initiative was taken to start thinking about new possibilities for a better economic climate and the first plans for the Research Triangle Park (RTP) arose. The reason for this was that the notion penetrated that the jobs in the tobacco industry and the textile industry would not remain for ever.”. Besides this the wages in the tobacco and textile industries were not very high either. During the 1950s North Carolina had the second lowest per capita income rate in the USA, beating only Mississippi (US census 2005). This was caused by a high share of semi- and unskilled labour in the original industries of North Carolina, such as the tobacco industry, the furniture industry and the textile industry.

Table 3 Development in per capita income in Durham County between 1959 and 2000
(Income in 1989 CPI-U adjusted dollars1/) (US Census 2007b,c)

State and County	1959	1969	1979	1989	2000
United States	$7,259	$9,816	$12,224	$14,420	$21,587
Durham County, NC	$6,357	$9,058	$11,442	$15,030	$23,156

Table 4. Development in median family income in Durham County between 1959 and 2000
(In 1989 CPI adjusted dollars1/) (US Census 2007b,c)

County	1959	1969	1979	1989	2000
United States	$22,210	$30,169	$33,374	$35,225	$41,994
Durham County, NC	$19,134	$27,422	$32,317	$38,578	$43,337

4.1.1 Unemployment

The mechanization and modernization of these company branches would increase the production, but less jobs would be necessary to keep the production process going. The decrease of the number of jobs went gradually, although the definite closing of the American Tobacco factory halfway the 1980s was a big setback. The last tobacco-related activities disappeared halfway the 1990s from Durham. Ullmann (1988) explains the decline in the tobacco-industry in general because of the realization by the public that smoking/chewing tobacco is live threatening.

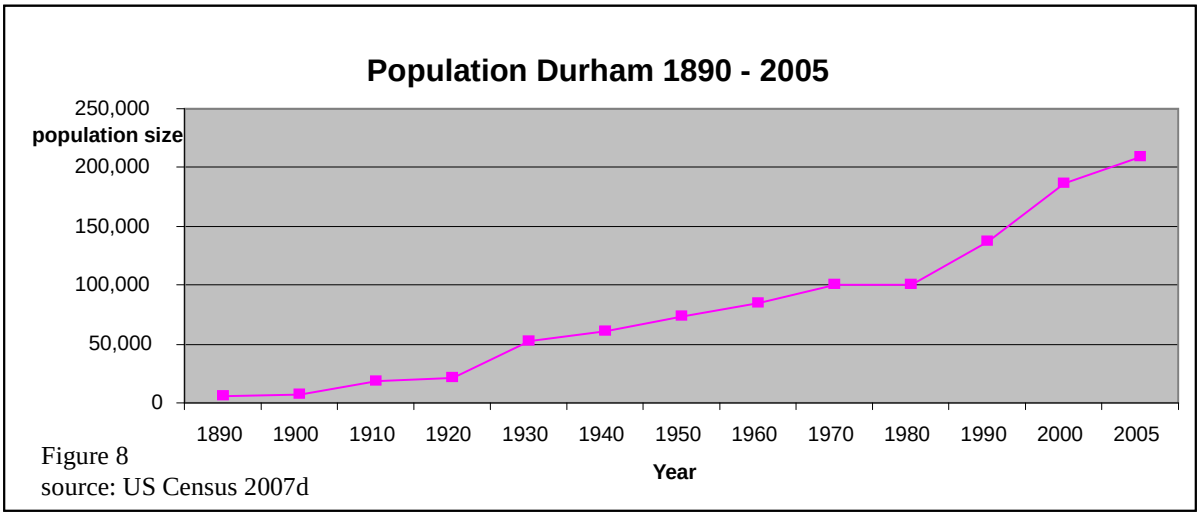


Figure 8
source: US Census 2007d

The percentage of tobacco users in the U.S. declined from 45% in 1967 to 32% 1988. But the production kept growing, which means that the usage of tobacco-products has increased. But smoking per capita declined in the beginning of the 1960's. This is especially the case by the growing smoking population of mainly minorities and new smokers. Sales in tobacco have been falling since about 1985 between 3 and 5 % till 1992. The taxes and sales prices almost doubled between 1980 and 1986.
The population of Durham kept growing despite the growing unemployment rates. An explosive growth took place after the Research Triangle Park really got started (see figure 8), although Durham county grew not as rapidly as for example Wake county (see table 5).

Table 5 Population growth in Wake county and Durham county before and after RTP. (Historical Decennial Census Population, US Census 2007d)

Wake county population:

year	*pop.*	*abs +/-*	*% +/-*
Before RTP			
1900	54,626		-
1910	63,229	*8,603*	15.70%
1920	75,155	*11,926*	18.90%
1930	94,757	*19,602*	26.10%
1940	109,544	*14,787*	15.60%
1950	136,450	*26,906*	24.60%
After start RTP			
1960	169,082	*32,632*	23.90%
1970	228,453	*59,371*	35.10%
1980	301,327	*72,874*	31.90%
1990	423,380	*122,053*	40.50%
2000	627,846	*204,466*	48.30%

Durham county population:

year	*pop.*	*abs +/-*	*% +/-*
Before RTP			
1900	26,233		-
1910	35,276	*9,043*	34.50%
1920	42,219	*6,943*	19.70%
1930	67,196	*24,977*	59.20%
1940	80,244	*13,048*	19.40%
1950	101,639	*21,395*	26.70%
After start RTP			
1960	111,995	*10,356*	10.20%
1970	132,681	*20,686*	18.50%
1980	152,785	*20,104*	15.20%
1990	181,835	*29,050*	19.00%
2000	223,314	*41,479*	22.80%

Another phenomenon that took place in the area Raleigh-Durham-Chapel Hill, was the ' braindrain ' (Abernathy 2007, Byker 2007). The graduates of the universities in the region (Duke University in Durham, and the relatively cheap UNC (Chapel Hill) and State university in Raleigh) left after finishing up their study to the larger cities, such as New York and Chicago, to start their career there (Link 1995). Durham was looking for a way to give those persons a reason to continue to live and consume in the region. All the interviewed persons acknowledge this phenomenon as one of the main problems in the region. After a long time of planning and fundraising, in 1959 the first steps to the creation of the Research Triangle Park were taken (Link 1995, McLain 1955).

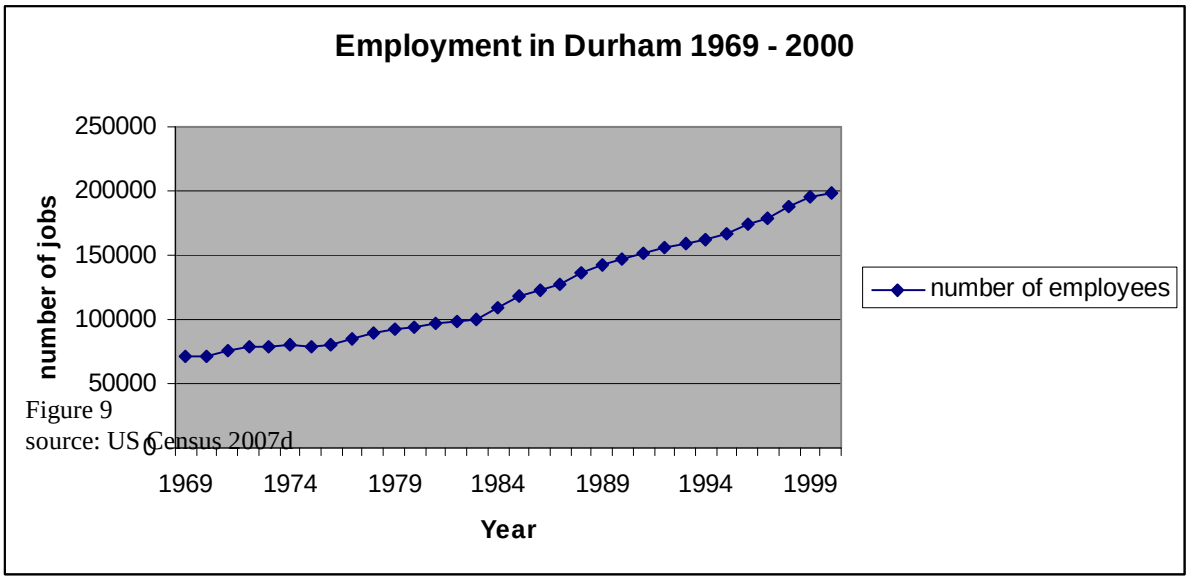


Figure 9
source: US Census 2007d

4.1.2 Interferences & initiatives

After a trial period of 8 years, in which it appeared to be difficult to attract and preserve companies, the breakthrough came in 1964/65 by the decision of IBM computer factory to build a factory on the park. This showed to work as a magnet on other companies. IBM is with 13,000 employees the largest employer of the RTP and one of largest in the region. On world scale IBM is the largest employer in the field of information technology with more than 350,000 employees worldwide. In the early years of the factory there were still servers and hardware produced, jobs at the same skills-level as the vanishing jobs in the tobacco - and textile industries (Link 1995, Luger and Goldstein 1991). This ensured easily new work for people who lost their jobs in these decreasing branches. And more recently this is also the case with Aisin AW, a large producer of transmission components for the car industry (Toyota).

Another large employer who established itself on the park was Northern Telecom, nowadays Nortel Networks. This company came to RTP in the 1970s and was for some time with approximately 9000 employees the second largest employer of the park and was also responsible for the success of the RTP. This company however was one of the victims of the huge falls of the internet and ICT market around the year 2000 and is now with 2800 employees the number 4 employer. To complete the top 4, the numbers 2 and 3 are GlaxoSmithKline (Glaxo) and Cisco Systems. Glaxo is at this moment the second largest employer with 5000 employees. This pharmaceutical company established itself at the end of the 1970s / beginning 1980s on the RTP and started then with only 40 or 50 employees. Number 3 on the list of largest employers is Cisco Systems with 3400 employees (RTP 2007) (see also appendix 2; list of companies at RTP).

The basis for the RTP has been the creation of replacing jobs and holding the higher educated graduates and re-school the workers that couldn't find a suitable job. Another important factor for the success of the RTP in this region was the 'Quality of life' (Luger and Goldstein 1991, McLain 1965). This means that living in this region is relatively cheap in relation to living costs and it is possible to live and consume in green surroundings with good connections to the rest the country (Luger and Goldstein 1991). And it was important that Durham (city and County) had a good policy which made it attractive to companies to establish themselves on the RTP. Certain incentives (establishment aims) made it very advantageous for the companies.

The three universities in the region, Duke University in Durham, UNC in Chapel Hill and NC State University in Raleigh (75,000 students in total), did their best to preserve their graduates for the region. An advantage with this is that the 3 universities are complementarily to each other. Duke and UNC are more medical and research focused, State is more focused on agriculture and biotechnology. These attempts fit in with Porter's ideas about the economic competitiveness of the U.S. According to Porter (1985) the U.S. should achieve and sustain a technological lead in product and process technology, and in order to reach this improvement in the quality of the U.S. human resources is needed, in other words, the workforce skills have to upgrade to a higher level. He also suggests to eliminate artificial disadvantages created by national government, like institutional barriers that are obstacles for firms to compete on an international level. He saw a great

Figure 10 The location of the RTP in the USA
source: www.rtp.org 2007

role for the government to make these things happen, to sharpen and adjust the government policies. Only, in the triangle region the initiatives didn't come from the government alone, also the local universities and some people from the local business world were involved. Important persons who were involved at the establishment and development of the RTP are Archie Davis, Luther Hodges and Terry Sanford (Rooks 2007, Byker 2007, Abernathy 2007). Davis was as director of the Wachovia bank, important in the search for investors and invented the set-up to a foundation for controlling the RTP. This foundation (Research Triangle Foundation, RTF) was and is conducted by people both from businesses, the government and the three involved universities. Hodges was governor of North Carolina during the 1950s and one of the initiators of the first meetings about how to get a better living standard in North Carolina, which resulted in the creation of RTP. He was US secretary of commerce from 1961 to 1965, the department responsible for commercial activity and industry, and became afterwards President of the RTP. The last person, Terry Sanford, was the successor of Hodges as governor of North Carolina (1961-1965) and had also good connections in the White House as a good friend of president John F. Kennedy. He was the one that lured IBM to the RTP in his period as governor of North Carolina and convinced president Kennedy to take the decision to move the National Institute of Environmental Health Sciences to this area, which took place in 1965. Afterwards he became president of the Duke University that developed under his inspiring and ambitiously control (of 1969 to 1985) into a large and important university of stature. Duke university and hospital are at this moment the largest employer in Durham County, with approximately 30,000 up to 35,000 jobs.
At the same time in the 1950s, Romeo Guest examined on his own initiatives to improve the economy of North Carolina. He also reached the conclusion that the knowledge of the 3 universities could be better exploited. He eventually came up with the term research triangle. Together with Karl Robbins he started a private company (named Pinelands) and bought 4000 acres in the triangle area and tried to attract companies (Byker 2007, Rooks 2007). They had a hard time because the economy at that moment was not strong enough. After Guest and his ideas had been presented to the governor Hodges, the plans were added together. The private company of Guest was taken over by a new established organization, invented by Davis, which would become the RTF.

A phenomenon that appeared with the arrival of the RTP, is that (white) residents took the possibility to move away from the largely black and poorer downtown area to new residential living areas closer to the RTP (Cain 2007). The city of Durham works hard so the employees can also live in the city. But most of the higher trained employees do not live in Durham, not only as a result of the exodus mentioned above, but also because the social climate in the 1990s was not as good as in the

neighboring smaller places (Conner 2007, Cain 2007). An example of this is for example the quality of the education. In the 1970s and 1980s the educational level in Durham was equal to that of communities in the region, but in the 1990s the educational level of the schools in Durham lagged behind at the neighboring places. Because many higher educated people had school going children, they left Durham or just stayed away. This is one of the reasons why the policy of the city is now more targeted on living, instead of on working (Cain 2007). In 1985, the state of North Carolina has prohibited to annex territory of the RTP. The city of Durham was not amused with this decision, because she saw its 'golden egg' for taxes going up in smoke. One of the reasons why companies in the RTP don't have to pay taxes to the city is because city taxes are used for matters of safety, like the police and fire department. But because of the set up of the park, most companies have on-site protecting measurements. So for paying city taxes they wouldn't get much in return. County taxes are a different story, because those are used for community goods, like education and other community services which are used by the employees of the RTP.

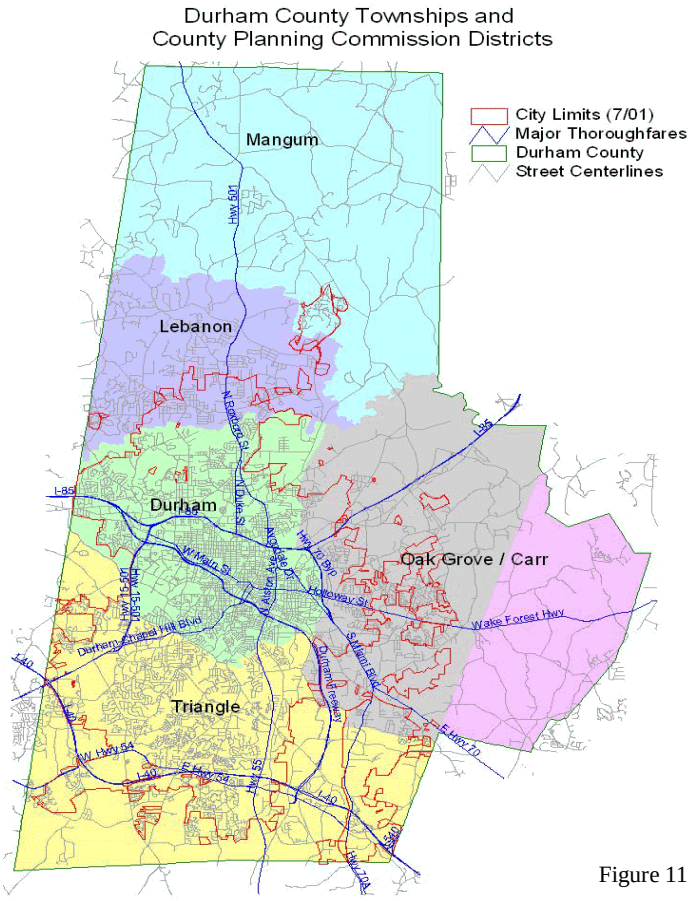


Figure 11
Map of Durham City and County
Source: Durham Planning Commission 2007

4.1.3 Business investments

The American tobacco historical district is a revitalization project nearby downtown Durham and the Durham Bulls baseball stadium. This former tobacco factory complex where famous brands like Lucky Strike were produced is part of a massive operation in Durham that has to lead to a upgrade and re-use of the former tobacco warehouses from the American Tobacco Company and from the Liggett and Myer complex. They are using the legacy of the tobacco industry for the redevelopment of commercial, office and residential usage (Abernathy 2007, Conner 2007). This can be seen in the light of Joseph Schumpeters creative destruction. Creative destruction was introduced in 1942 by the economist Schumpeter to describe the process with which large renewals take place. Schumpeter states that space

for renewal arises by destroying the old. Innovation goes together with transforming the existing. In the economy for example a dynamic new industry arises which makes products that replaces existing products. For example, the creation of the mobile phone will eventually replace the standard fixed phones. Remarkable is the big interference of the local government in this projects, because the government is not considered as an innovative surrounding. It is lacking the market dynamics which ensure creative destruction.

"*The opening up of new markets and the organizational development from the craft shop and factory to such concerns as US Steel illustrate the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one ... [The process] must be seen in its role in the perennial gale of creative destruction; it cannot be understood on the hypothesis that there is a perennial lull*." (Quote from "The Process of Creative Destruction" by Joseph A. Schumpeter, 1942).

Figure 12
Liggett & Myers under construction (2007)
Foto by G. van der Pol

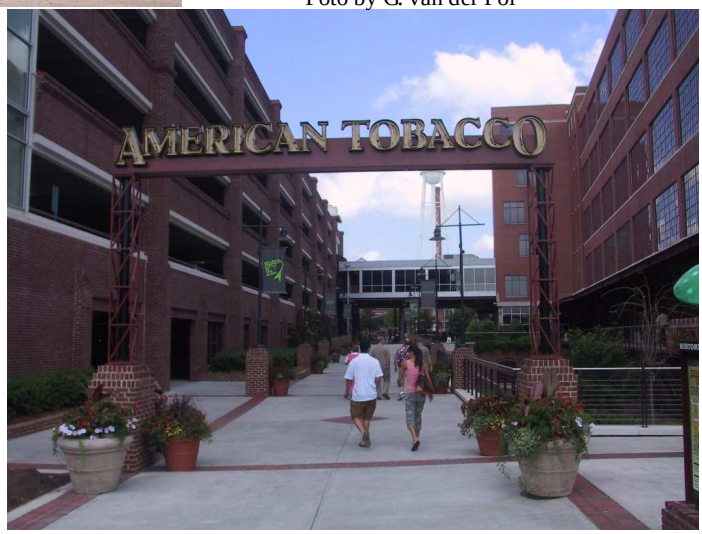


Figure 13
The new American tobacco district (2007)
Foto by G. van der Pol

4.2 Summary and conclusions

Also for Durham the wide scale of components and variables that can play a role in decline are applicable for its developments. Table 6 gives an overview and summary of the most prominent variables in relation to the situation in Durham.

Table 6 Durham and variables and components in economic growth and decline

Variable	***Did (not) take place in Durham***
unemployment and globalization	Unemployment under low-skilled tobacco and manufacturing workers. RTP created new jobs, also for higher educated people. Less influence globalization, although globalization can be seen as a necessary change for the success of RTP.
creative, high educated population	With 3 big universities creative and high educated people were available, but they left after graduation. RTP gave these people the opportunity to stay and this created also jobs for less educated people in for example the service industry
(Financial) investments	As well state and local government as businesses dared to invest in Durham and the triangle area. Relocating IBM and NIEHS are examples. Also reschooling programs were initiated with state and local funding by public schools.
Infrastructure / transport / connectivity	The completion of I40 and I85 were important factors for the success of RTP. Also the Raleigh-Durham Airport is important for the global operating companies located on RTP. Public transport is taken care of by the Triangle Transit Authority.
Income	The economy has changed from tobacco based to R&D based. Jobs in the R&D sector demand generally a higher education and a higher paycheck. For Durham and RTP this has resulted in a higher average income compared to the national average than in the tobacco era.
Quality of life	North-Carolina is known for its great nature. Durham and surroundings are no exception.
Local policies / partnerships	RTP was a combination of local private initiatives and public state initiative. The partnership between this parties led to the successful RTP.
Long term planning	The initiatives for creating a higher average income. Long term planning is now focused on the possible miss-match between supply and demand in what sector students graduated and in what sector jobs are available.
Economic diversity	The economy of Durham is pretty diverse, although there is a big focus on R&D and services. But these industries can be subdivided in several smaller sectors.

Chapter 5: *A discussion, Emmen and Durham head to head*

5.1 Agglomeration advantages

The cluster theory of Marshall, described in chapter 2, can be applied to both regions, but the outcome is different. The cluster theory of Marshall as explained in chapter 2 is good applicable to the developments in the Research Triangle. Information spill over happens in the surrounding cities where employees recreate with each other or during the ride to work on the bus or on a walk outside during the lunch break. The companies in the downtown business area of Durham are partially able to exist because of the need for support by all the companies in the Research Triangle. This not only applicable for Durham, but also for Raleigh, Cary and other cities in the area. The third condition mentioned by Marshall is the local skilled-labour pool. With three big universities in the area with a total amount of approximately 75,000 students and several other small colleges there are enough local skilled future employees present.

From the three conditions extracted by Marshall two can be applied in southeast Drenthe. Information spill over happens in the city of Emmen at activities or during recreation in the surroundings. And because of the presence of a lot of manufacturing companies there are supporting businesses in the city. But not on the same scale as in the Triangle region. The local skilled-labour pool is missing in Emmen. The peatworkers were not skilled for the manufacturing jobs and the manufacturing workers are now not skilled to fore fill the upcoming demand for high educated employees (healthcare for example). Southeast Drenthe has a low percentage of high educated residence when compared with the national average.

5.2 Economic growth, shrinkage and developments factors

As described in chapters 3 and 4 in both regions the changeover from a industry built and based on a hand-labour-intensive economy (peat and tobacco) to a manufacturing and knowledge based economy started in the 1950s. The aims for these changes are however different. In the Research Triangle two aims were important: the high educated graduates of the three present universities which left the region by lack of suitable jobs and the increasing number of unemployed persons within the tobacco, textile and furniture industries as a result of modernization and mechanization of the production processes. In the municipality Emmen and the peat areas the reason was the high number of unemployed persons as a result of a decreasing demand for peat as a result of upcoming other energy sources such as coal, oil and natural gas.

In the Research Triangle the goal was attracting capital and businesses which had to provide suitable jobs for the high educated graduates so that they remained in the region and in jobs for semi- and unskilled manufacturing- and land workers to put a hold to the unemployment in those sectors. This was realized in the middle 1960s with attracting IBM and the National Institute or Environmental Health Sciences. The initiators behind this were strong local business and political individualities. IBM and the National Institute or Environmental Health Sciences can be considered as the key companies within the framework of the growth pole theory of Perroux. As a result of commissioning these companies several companies within the agrarian, biotechnology, (bio) medical and physicist research world followed (see appendix 2; list of companies at RTP). After these companies had established themselves in the region and survived here for longer time, spinoff in other sectors took place. In the service sector of Durham, where after the decrease in the `base' industries jobs had disappeared, jobs came available in the retail and recreational sectors. Besides this there were also jobs available for the semi- and unskilled workers within the production department of IBM and Aisin AW. This also can be seen within the cumulative causation theory of Myrdal such as described in chapter 2. The growing economy and number of companies and jobs were caused because it was known that there were jobs and employees available in the region. This draws both companies and employees to the region because their needs are provided. There are enough employees for the companies and enough jobs for the employees. The advantages of this course of circumstances have not only influence on Durham. The clustering and agglomeration advantages are also exploited by neighbouring cities, maybe even better then by Durham (see table 5). The increase of the inhabitant number of the adjacent Wake County for example is in terms of percentage and absolutely higher than that of Durham (US census 2007d). The changes in the regional economy of Durham can be explained by a number of factors that are filtered from the literature. In Durham (and the complete Triangle region) enough and a high offer of education is present. The city also accommodates a diversity of races and ethnic minorities. The degree of racial inclusion has not been sufficiently examined within this research for a good founded conclusion. During the interviews (with only white persons) this subject has been hardly discussed. It is a sensitive subject in this region where slavery and discrimination were perhaps not as terrible as in Southerner states, but where it has predominated a large part of the history. This is part of the legacy of the region.

Durham has excellent connections concerning the infrastructure with the rest of the country. The highways I-40 and I-95 go to all remaining wind regions and the Raleigh/Durham (RDU) Airport gives an other excellent connection. In the tobacco-era the railroad track was much used and this is still

available. The construction of more highways and the extension of the RDU Airport (in common use with the neighbouring counties) improves the accessibility and is one of the indicators of the increasing economy of the region. The income in the region and of the complete state North Carolina has increased since the change to an R& D based economy to and above the national average. An other factor which is important for the successful economic development are the environmental factors, the quality of life variables. The gentle climate, the green and relatively safe environment, good supplies in the neighbourhoods and the relatively cheap standard of living makes Durham and the Triangle Region a pleasant place to live. These 6 indicators are in accordance with the 6 factors which are defined by Lambooij (Economic and demographic size and differentiation, Production systems, labour productivity and entrepreneurship, Connectivity (transport infrastructure, ICT and people), Consumption system, Attractiveness and Adaptation after innovation and technological changes) and have had a positive impact on the economic development of Durham and surroundings.

In Emmen the changeover was initiated by the local and federal governments. The good relationship of the Mayor and Alderman with The Hague were partially responsible that the AKU, later Akzo Nobel, came to Emmen. This development also can be considered as the arrival of a key company such as in the growth pole theory. But in contrast to Durham and the Research Triangle, the big change and economic development stayed behind in Emmen. As shown in chapter 3 Emmen missed critical surroundings factors and preconditions which were defined in the literature (see table 1). The facilities which were desired by the AKU, were constructed within limited time. Suitable houses for the workers were built, sport facilities and infrastructure (railroad and public transportation) were created. This resulted in (temporary) employment, but Emmen still wasn't 'booming'. One of the problems was the low percentage of skilled employees. Lacking a university or college was one of the reasons that there lived little (high) skilled workers in the region. There were, however, a lot of unemployed persons who were eager to get to work and that were used to hard labour from the peat industry. Retraining the peat workers to factory workers was paid for by the government, this was one of the other incentives enforced by the AKU. Ethnic minorities played no big role in Emmen at first sight. Under the inhabitants was a difference between people born in the region and people from other regions. During the peat-era a bunch of workers moved from western Netherlands and from Germany to Emmen and southeast Drenthe. But the background and also the mentality of these groups do not differ.
The lack of high educated employees (see chapter 3) and good infrastructure and accessibility stood and stands in the way of economic growth and development. The population of Emmen has always been poorer than the national average. The difference between the national average and the region

southeast Drenthe has in the past 50 years become smaller. Thole (2007), statistician of the municipality Emmen writes about this: "*Half a century ago the average income of the inhabitants of Drenthe lay a quarter (25%) lower than the income of the average Dutchman. During the years the difference has always become smaller and was in 1975 shrunk to 10% and 10 years ago even up to 2 to 3%. The difference has grown the last years not smaller but correctly larger and according to the last data of CBS (2004) to 5%. In 1998 the average income of a Drent was € 465 lower on an annual basis than of an average Dutchman, in 2004 this difference had increased up to € 600 by inhabitant.*"

5.3 Head to head

Emmen has always been a region that needed special care in social economic ways. Founded as a farmers community with tight family relations, the general inhabitant was kind of on their own. With the start of the peat-development whole families worked in the peat. Those were long days of hard work and there wasn't a lot of time to socialize. Also the living circumstances were poor. This held on till after the second world war, when changes set in for a better and higher living standard in the region southeast Drenthe. And with the turn from peat industry based community to industrial based community in the 1960s and 1970s the region was purchasing economic development in a new way. For Durham the progress for better living standards and new jobs for unemployed manufacturing workers began in the 1950s with the start of the RTP initiated by the state government with good relations in the White House and a few local private businessmen that arranged the capital and land that was needed.

The two regions will be compared to each other by the 7 factors distillated out of the theoretic framework in chapter 2. Together with the chapters 3 and 4 and the tables at the end of those two chapters it is possible to give an comparison between Emmen and Durham in table 7.

Table 7 Emmen and Durham compared

Factor	***Emmen***	***Durham***
Population and social networks	Population was used to work hard and willing to learn. It was cheap labour for companies. Strong family networks (whole family work together)	Population was low-skilled. High educated graduates left area. Strong social networks, encouraged by racial differences (e.g. Black Wallstreet).
Diverse economy	First just peat-related with some services and retail. After WOII manufacturing very strong. Since the 1990's services and healthcare are rising.	First tobacco and furniture related. After WOII change to R&D and (financial) services and healthcare.
Good infrastructure	During the peat era enough waterways for transport. After the arrival of the cars, long time no good connection with the rest of the country. Since a few years a highway (A37) is finished and gives opportunities for transport and logistic companies to establish themselves in Emmen.	From the beginning a railroad connection with water supply. Interstate I40 was constructed during the 1960's. A new airport opened up in 1943 (RDU) and is of big importance for the success of RTP.

Investment (education and technology)	The federal government invested in regional areas in the 1970's. Local government invested to attract companies also (see AKU). Peat workers were reschooled by the AKU and other manufacturers. The local government and business are now also involved with a knowledge centre to stimulate knowledge exchanges between education-institutes and companies.	RTP is a perfect example of investment by public and private parties. As described money was raised and land was bought. The rest is history. Companies invested in reschooling the tobaccoworkers, but mainly hired graduates from the surrounding universities. These creative minds are now involved in R&D for new technologies and medicines.
Quality of life /attractiveness	Emmen has a very green and friendly landscape, perfect for hiking and biking. Also for cultural activities and entertainment is well taken care for. The zoo is a extra quality of the city.	Durham has also green surrounding. And in the triangle region is always something to do. Besides this the subtropical climate is excellent. Combined with good education this region is very attractive.
(tax) Incentives	The AKU wasn't coming to Emmen without great (financial) advantages. Besides this also houses, good public transportation and sport- and entertainment facilities were enforced. Federal government gave subsidies for companies that moved to the region.	The state North-Carolina decided that the companies that moved to RTP didn't have to pay Durham's city-taxes. Also state and city subsidies were available as well as a good water and sewer system.
Local policies/ partnerships	Initiatives were taken by the local government and social work projects. Today partnerships in housing (Emmen revisited), business expansion and education (commercial club Emmen and A37 region) are involved with new initiatives and economic growth.	The public-private initiative to start RTP is a great example of a partnership that was successful. This lives on in the research triangle regional partnership (RTRP). Partnerships in Durham city centre are responsible for successfully rebuilding and revitalize the former tobacco fabric sites.

5.4 Recommendations

Based on the chapters above and the discussion in this chapter it is justified to conclude that the 7 factors distillated from the literature (Population and social networks, Diverse economy, Good infrastructure, Local policies / partnerships, Quality of life / attractiveness, (tax) incentives and Investment) are indeed of great influence of the economic (re)development of a region. It deserves the recommendation to provide these variables with the right ingredients.

- One thing that deserves recommendation is that declining cities do have to accept the fact that the decline has set in (Matthiesen 2005). If the concerning city is realizing that smaller is not always worse, the first step to recovery has been made. Subsequently, cities can decide to sell parts of the city-grounds to developers that can and will bring quality back in to the city.

- One of the negative impacts of decline is the lower tax-income of the city. The lower income has as a result that cities have to choose which investments have priority. As a solution for this most cities decide to raise tax-levels so the city income will rise. This has usually as a consequence that more people and/or companies will leave the city. So it deserves recommendation not to raise taxes in time of decline. A better solution which is given by Rybczinski & Linneman (1999) is to privatize some city

services, like maintenance of the infrastructure and public transportation services. This has a twoway positive influence on the city. Private organizations are in general better organized and work more efficient. The services will be better and the city makes some money for selling these services.

- An other conclusion that can be drawn is the necessity of good infrastructure and accessibility. Infrastructure is coming back in almost every discussion about decline and growth and also in the in chapter 2 discussed literature infrastructure is seen as an important factor for economic success. Both for employees and employers as for suppliers and consumers it is for obvious reasons important that the place where will be worked or recreated or consumed is within easy reach. As the developments in the Triangle region show, the region is taken by the hand by the infrastructural developments. The creation of the I40 in the 1960's and the availability of Raleigh-Durham airport have taken the developments of the RTP to another level. The lack of good infrastructure plays part in the modest economic development in Emmen and southeast Drenthe. But it is also possible that too much infrastructure is already available. Than it might be possible to restructure the infrastructure so business and housing areas can be on separated routes and can be reached more efficient. Interventions and restructuring projects of this size demands involvement and investments of local and federal governments to keep overview over the total urban redevelopments and to coordinate the projects.

- It also deserves to provide a good living climate for employees and companies. This can be reached with good and enough schools, multicultural events and entertainment for al age-categories. In both regions the surroundings are pleasant for hiking or biking or other recreational activities. It is important to have good sporting facilities, education facilities, recreation facilities and for instance public transportation. After all, it is not only the president of a company that decides where to move and what motives are important, the decision will be taken in consultation between the president and his wife and kids (Huising 2007). When all these ingredients are present, it will stimulate the strength of social networks. This can play a role in dealing with the so called braindrain. If the high educated employee has a family that likes to live in the urban region with al its social bonds and the employee is also happy with his surrounding, he will stick to the place (Matthiesen 2005).

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List of interviewed persons

Interviews taken in the US

- Abernathy, T. (Ted), CEcD, Executive Vice President and COO, Research Triangle Regional Partnership. Interview date: June 14, 2007

- Byker, P. L. (Patrick), Special consultant at Kennedy Covington attorneys at law, specialty: land use and zoning. Previously: Vice President of Government Relations with the Greater Durham Chamber of Commerce. Interview date: May 23, 2007

- Cain, A. (Aaron), senior planner with the Durham City-County planning department. Interview date: June 13, 2007

- Conner, E. (Ted), Vice President of Economic Development, Greater Durham Chamber of Commerce. Interview date: June 6, 2007

- Rooks, E. (Liz), Executive Vice President of Planning and Development management, Research triangle Foundation. Interview date: May 30, 2007

Interviews taken in the Netherlands:

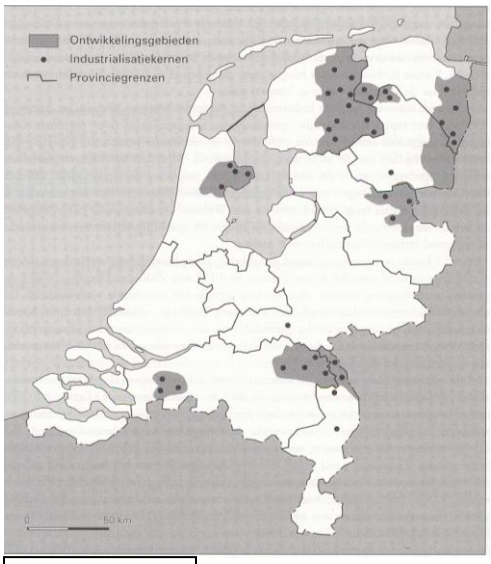
- Cate, J.M. (Hans), Researcher industrial history in Emmen. Previously: Location manager Chemical park Delfzijl and chief technical service Akzo Nobel Emmen. Interview date: October 18, 2007

- Huising, J.D. (Jan Dirk), senior Urban Planner and Designer, municipality of Emmen, department of Urban and Regional Physical Spatial Development. Interview date: October 15, 2007 and June 14, 2007 by email.

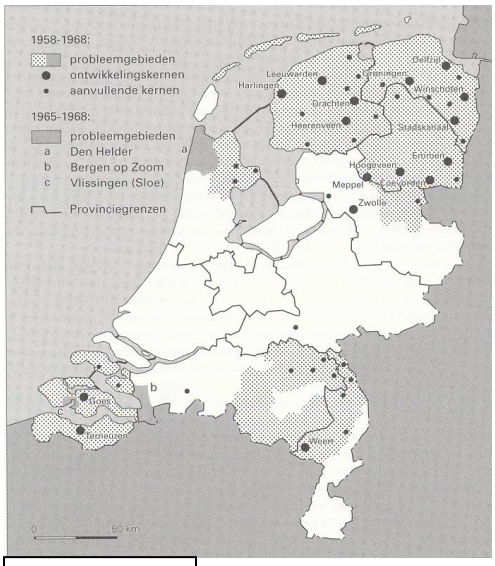
Appendix 1:

Regional policy from 1952 to 1994: from development areas to regional programs

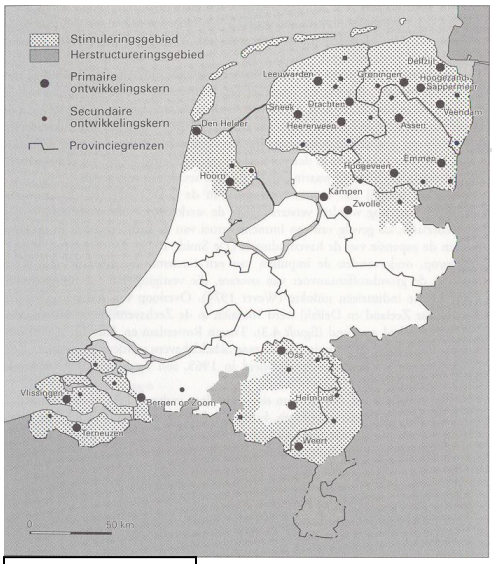
Source: Pellenbarg 2006



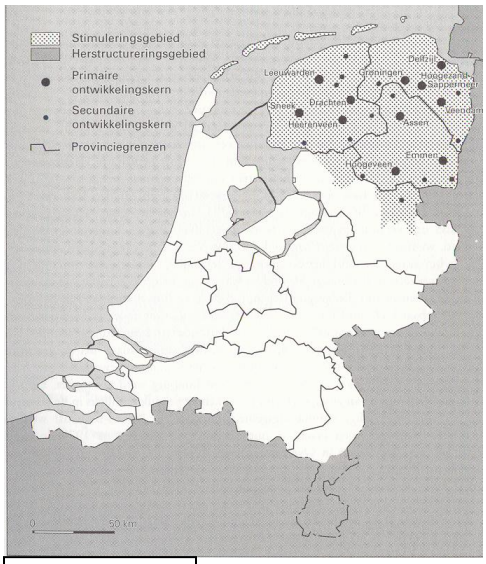
1952-1958



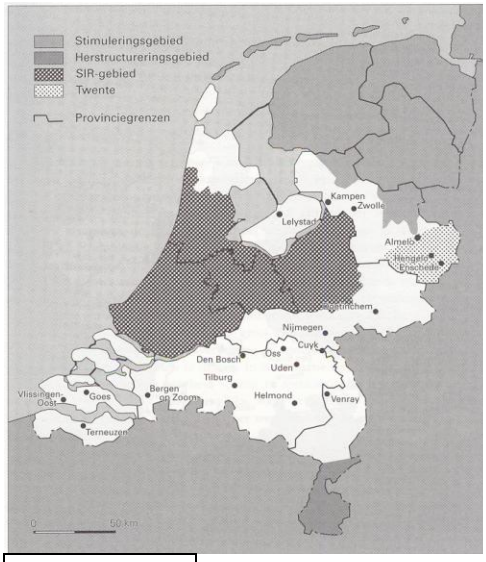
1958-1968



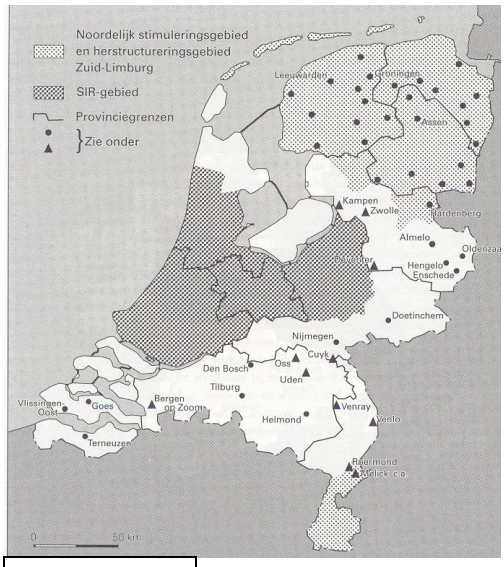
1969-1972



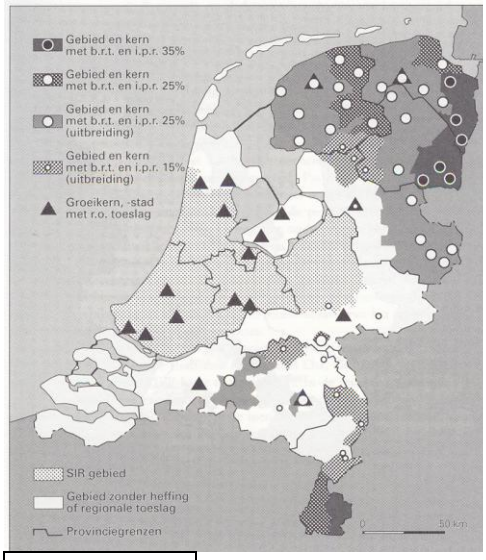
1972-1975



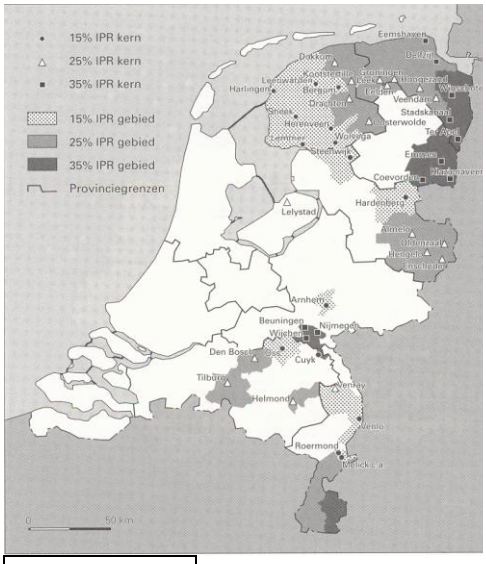
1975-1978



1978-1981



1982-1985



1986-1990

1990-1994

Appendix 2: list of companies at RTP:

Biotechnology/Agricultural Biotechnology/Biological Agents
40 AlphaVax, Inc.
49 BASF Corporation Agricultural Product Center
2 Bayer CropScience
47 BioAbility, LLC
63 Biogen IDEC
45 Botanics Integrated, LLC
44 Civatech Oncology
64 Diosynth Biotechnology
25 Entegrion, Inc.
36 Humacyte
10-B North Carolina Biotechnology Center
44 Nufarm Americas, Inc.
44 Precision Bioscience, Inc.
62 Qualyst, Inc.
33 Syngenta Biotechnology, Inc.
47 Zen-Bio

Chemicals
44 Chemiceuticals
1 Reichhold, Inc.
44 Southcot, Inc.

Electronics/Nanotechnologies
29 Accurate Electronics, Inc.
41 BOC Edwards
18 Cree, Inc.
59 Delta Products Corporation
29 Discover Technologies Inc.
8 DuPont Electronic Technologies
48 Good Technology
52 JMC (USA), Inc.
44 Microelectronics Assembly Tech.
28 Nextreme Thermal Solutions
17 Sumitomo Electric Lightwave Corporation
14 Troxler Electronic Laboratories, Inc.
62 Xintek, Inc.

Environmental Science
42 Alion Science and Technology
25 General Engineering and Environmental of NC, Inc.
37 Integrated Laboratory Systems, Inc.
51 National Institute of Environmental Health Sciences
51 National Toxicology Program
47 Tetra Tech, Inc.
30 The Hamner Institutes
11 USDA-Forest Service-Southern Research Station

Financial Services
53 Credit Suisse
65 Fidelity Investments: Construction Site

IT/Informatics/Telecommunications/Pervasive Computing
29 Aten Inc
29 BrandPort, Inc.
37 Caspian Networks
25 Chorus Systems
58 Cisco Systems, Inc.
29 Collaborative Studio, Inc.
23 Computer Sciences Corporation
29 Customized Technology Services Corporation
29 Device Solutions LLC
57 Ericsson, Inc.
48 Extreme Networks
47 Geomagic, Inc.
25 GretagMacbeth, LLC
29 i5inc.
12 International Business Machines Corporation (IBM)
29 Learning Machines, Inc.
34 Management Information Systems Group, Inc. (MISG)
29 Mi-Co
61 Network Appliance
29 Network Development Group
38 Nortel Networks
29 OC3 Entertainment
29 Pocket Science LLC
29 RadarFind Corporation
29 SnowFin, LLC
37 Software Development Europe, Inc.
25 STG, Inc.
29 The Wireless Technology Group, Inc.
37 Triangle Research Collaborative

Materials Science
7 Bekaert Corporation
7 Bekaert Flex Circuits

Non-Profit Organizations/Associations
32 American Association of Textile Chemists and Colorists (AATCC)
10-C Burroughs Wellcome Fund
44 International Union of Pure and Applied Chemistry (IUPAC)
45 ISAF (International Service Assistance Fund)
45 Kramden Institute, Inc.
10-E MCNC
34 Motor & Equipment Manufacturers Association
10-A National Humanities Center
3 North Carolina GlaxoSmithKline Foundation
47 North Carolina Healthcare Information and Communications Alliance
27A Research Triangle Foundation of North Carolina
27B Research Triangle Park Headquarters: Future Site
28 RTI International
46 Sigma Xi, The Scientific Research Society
10-D Statistical and Applied Mathematical Sciences Institute
20 The Instrumentation, Systems, and Automation Society
27A Triangle Universities Center for Advanced Studies, Inc. (TUCASI)

Other
37 Craig Davis Properties
15 EMC Corporation
29 Instrumentation Associates
10-D National Institute of Statistical Sciences
5 North Carolina State Education Assistance Authority
62 Pappas Ventures
37 Radisson at RTP
56 Sony Ericsson Mobile Communications (USA), Inc.
6 The Enrichment Center by Bright Horizons
4 The University of North Carolina Center for Public Television
21 Triangle Life Science Center (TLS Center)
27A Triangle Service Center, Inc.
16 UAI Technology, Inc.
35 Underwriters Laboratories, Inc.
50 United States Environmental Protection Agency
19 United States Postal Service

Pharmaceutical/Biopharmaceutical/ Medical Devices
62 Aerie Pharmaceuticals, Inc.
36 Alnis BioSciences, Inc.
36 BD Technologies/BD BioVenture Center
45 BioMarck Pharmaceuticals, Ltd.
44 Bioptigen
47 Clinipace
29 Cognosci, Inc.
16 CPKD Solutions, LLC
45 Duke Mass Spectrometry Facility
55 Eisai Inc.
29 Endacea, Inc.
44 Eno Research & Development, Inc.
3 GlaxoSmithKline
28 Howard Associates, LLC
44 Invitrox
29 Jenken Biosciences, Inc.
62 Kucera Pharmaceuticals, Inc.
44 Saha Pharmaceuticals
9 Stiefel Research Institute
54 Synthon Pharmaceuticals, Inc.
25 Talecris Biotherapeutics
29 Teotten Diagnostics, Inc.
29 Tricon Pharmaceuticals, Inc.
29 Turrett Labs (Medibeam Health Monitors)
37 United Therapeutics Corporation
62 Xsira Pharmaceuticals (Formerly Norak Biosciences Inc.)

Professional Business Services
29 Arneson & Associates
29 B W & Associates
37 Bank of America
37 Carolina Group Insurance Services, Inc.
34 Clean Design, Inc.
29 Erevnion, Inc.
37 Fiducial-Comprehensive Accounting Services, Inc.
37 First Citizens Bank
29 First Flight Venture Center
47 GSA Defense Logistics
47 ICF Consulting
37 Liggett Vector Brands, Inc.
25 Lineberry Research Associates
29 Mechanical Specialties Contractors, Inc.
29 New Media Campaigns, Inc.
29 Parrish Brian Partners, Inc.
25 Practical Management, Inc.
62 Southeast TechInventures
29 Spratt Financial
37 Teer Associates
16 Triangle Transit Authority (TTA)
37 Wachovia Bank
29 Wesinco, Inc.
47 MASF, Inc.
A* Recreational Fields 1&2
B* Recreational Fields 3&4

Available Properties
TMC Previous Triangle Metro Site
S-1 Site 1
S-10a Site 10a
S-1b Site 1b
S-20 Site 20
S-28 Site 28
S-29 Site 29
S-3 Site 3
S-30 Site 30
S-31 Site 31
S-32 Site 32
S-33a Site 33a
S-4 Site 4
S-7 Site 7

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